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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Crops Research Division

THE NATIONAL POTATO-BREEDING PROGRAM, 1956

U. S. DEPT. OF AGRICULTURE
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AUG 12 1968

C & R-PREP.

By
Robert V. Akeley and Others,
Vegetable Crops Section
and
State Cooperators

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(Twenty-Seventh Annual Report to Cooperators)
Plant Industry Station
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NATIONAL POTATO-BREEDING PROGRAM, 1956

By Robert V. Akeley

Yields and Total Solids

Seedlings and varieties resistant to several potato diseases were tested for yield in Maine. The most promising are two early-maturing varieties, B 3692-4 which is resistant to late blight and viruses A and Y, and B 3653-15 which is resistant to late blight, verticillium wilt, and virus A. Their yields and percentage total solids were similar to those of Irish Cobbler. Seedlings B 595-76, B 3095-18, and B 3299-13 had mean yields for 4 locations of 576, 563, and 552 bushels of U. S. No. 1 potatoes per acre, respectively, which compared favorably with 604 bushels for Katahdin and 522 for Russet Burbank. The mean percentages of total solids for all locations were 18.5 for B 595-76, 17.4 for B 3095-18, 17.7 for B 3299-13, 17.3 for Katahdin, and 18.5 for Russet Burbank. Seedling B 595-76 is resistant to commercial diseases, as indicated in previous reports. Seedlings B 3095-18 and B 3299-13 are very resistant to leafroll virus and have acceptable tuber characteristics. The high percentage of total solids for selections grown at Mount Vernon, Wash., are presented in Carstens' table 2. This shows the effect of environment very well.

New Varieties

Tawa, released jointly by the United States Department of Agriculture and the Agricultural Experiment Stations of Iowa and Michigan, is early in maturity, has white smooth tubers, is high in total solids, is immune from latent mosaic, and has resistance to scab, late blight, and mild mosaic. Onaway will be released jointly by the United States Department of Agriculture and the Agricultural Experiment Station of Michigan. It is a high-yielding early-maturing variety with resistance to common scab and field resistance to late blight. Variety 43 is being released by the Alaska Agricultural Experiment Station. It is primarily for the home garden where high quality is much more important than high yield.

Golden Nematode

Several selections with desirable horticultural characters in combination with resistance to golden nematode and late blight were tested and selected this year. These new selections are better in all respects as parents than the original ones from a cross between Solanum tuberosum and S. andigenum.

Late Blight

The report by the Late Blight Committee by M. E. Gallegly, et al. shows progress and understanding in our search for immunity and field resistance. The recent discovery that sexual mating groups exist in Phytophthora infestans in Mexico raises the question of origin of new races through genetic recombinations. Also, the possibility of survival of the sexual

or oospore stage must be considered. So far, only one of the mating groups has been found in North America, but both groups have been found in Mexico. More sampling is needed in the United States and Canada before it can be stated definitely that only one mating group is present in these areas. Many of the potato breeders are sending and will continue to send selections for field test to J. S. Niederhauser in Mexico. This seems to be the best method for determining the degree of field resistance to late blight in a selection. We hope that a satisfactory greenhouse technique for selecting field resistance to late blight will be developed eventually.

Solanum Species and Hybrids

Crossability investigations among *Solanum* species and meiotic investigations of species and hybrids are being made at Beltsville, Wisconsin, and Pennsylvania. Hybrid seed has been obtained from many interspecific pollinations. A reduction in fruit set and average number of seed per fruit has been observed following interseries crosses. The series *Polyadenia* represented by the single species *S. polyadenium* is well isolated from the other series. Interspecific pollinations involving this species usually result in failure. Seed from three interspecific crosses with this species has been obtained at Pennsylvania. Crosses have been successful between many artificially induced tetraploids of diploid species and hybrids and *S. tuberosum*. No seed has been obtained from crosses of artificially induced tetraploids of *S. pinnatisectum* and *S. tuberosum*.

Leafroll

The leafroll problem is receiving more attention from various workers, as indicated by the reports from Maine, Michigan, Idaho, and Iowa. In the Maine reports by Bonde et al., 29 resistant seedlings were compared in a replicated test. The results indicate that the seedlings varied in their resistance to aphid infestation and leafroll infection. Seedling B 3388-19 had 6 percent current-season leafroll infection and yielded 569 bushels per acre, B 24-58 had 12 percent infection and yielded 628 bushels, and Katahdin had 100 percent infection and yielded only 397 bushels. Since Katahdin, the most important American variety, is known to have some leafroll resistance, these figures give an idea of the progress made in breeding of leafroll-resistant potatoes. Leafroll-resistant selections having various multiple combinations of resistance or immunity from scab, late blight, viruses X and A, and verticillium wilt are now available.

Scab

Progress is being made in our research for scab resistance as indicated by reports from Idaho, Minnesota, Wisconsin, Maine, Iowa, and other States. At present, acceptable scab resistance has been combined with one or more resistances to most of the important potato diseases. The multiple-resistant scab selections will have either red, white, or russet skins. Improved parental lines and selections of commercial possibilities are indicated by most of the breeders concerned with scab resistance.

Ring Rot

Ring rot resistance in varieties of potato to be grown commercially is still needed, especially by those seed-growing States with a zero tolerance for certified seed. Progress in breeding for ring rot resistance is indicated in the report by R. Bonde. Seedling B 3141-3 yielded 726 bushels per acre and B 2854-1 yielded 740 bushels per acre. In the future, increased emphasis will be given to breeding acceptable ring-rot-resistant varieties that also have resistance to other potato diseases.

Verticillium Wilt

On the basis of recent reports from Idaho and Maine, many wilt-resistant seedlings that have promise as parents and commercial sorts were selected and tested. Some of these clones also possess multiple-disease resistance to leaf roll, scab, late blight, and virus Y and immunity from viruses X and A. In Maine, seedling B 3319-30, a medium-maturing variety, yielded 636 bushels of U. S. No. 1 tubers per acre compared with 609 for Irish Cobbler and 583 for Chippewa. B 3319-30 is resistant to late blight, scab, verticillium wilt, and immune from virus X. The late-maturing Seedling B 3429-23 yielded 615 bushels per acre and compared favorably with 605 bushels for Katahdin. B 3429-23 is resistant to late blight, scab, verticillium wilt, and immune from viruses X and A.

Virus Y

True immunity from virus Y in *Solanum tuberosum* has not yet been found, but varying levels of resistance are common. The reports from Maine and North Dakota indicate a high degree of field resistance to virus Y. Seedlings ND 457-1, B 2067-52, and B 2068-23 are excellent sources for this resistance. Over 90 percent of the selections from a selfed line of B 2067-52 did not show virus-Y symptoms in the Maine field test in 1956 and over 96 percent of the selections from a similar selfed line remained symptomless after a 2-year field test.

PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN AND AROOSTOOK FARMS (Presque Isle, Maine.)

R. V. Akeley, R. W. Buck, Jr., R. E. Webb, M. J. O'Brien,
E. S. Schultz and G. V. C. Houghland

Plant Industry Station

At Plant Industry Station, Beltsville, Md., in 1956, the breeding program was continued with over 300 crossed and selfed lines successfully hybridized. The parents used, their source, and main characteristics are given in P. I. table 1. The continuing objective of combining as many desirable horticultural characters and disease and insect resistances as possible into potato seedlings was followed with increased emphasis on resistance to ring rot and golden nematode. A number of crosses were made for Alaska using their selections as parents in combination with others.

Distribution

The distribution of potato seed, new seedlings, and tubers of named and numbered varieties was continued. A summary of the shipments is given in P. I. tables 2 to 4. The seed, new seedlings, and small lots of seed stock for States and foreign countries were shipped from Plant Industry Station, but many of the larger shipments were made directly from Presque Isle, Maine.

Chapman Farm, Maine

Thirty-seven promising seedlings and 8 newer varieties were increased in various amounts on the Chapman Farm. Plymouth, Pungo, Delus, Saco, Early Gem, and Tawa were among the varieties increased for future tests and distribution.

P. I. table 5 summarizes the maturity and fertility data on the 10-hill rows grown at Chapman Farm in 1956. Cool moist weather, ideal conditions for taking fertility data in the field, existed during the 1956 growing season. Of the total number of seedlings, 70.3 percent were judged early to medium in maturity, and 53.8 percent slight to good in fertility. About 7 percent of the 10-hill plots were selected for parents; for distribution to co-operators; or, for further tests in 1957.

Approximately 22,708 seedlings, representing 128 family lines grown in the greenhouse in Beltsville, Md., were planted for increase on the Chapman Farm. Germination averaged 96 percent for all seedlings and ranged from a low of 85 percent for the cross Katahdin x B 3195-3 to a high of 100 percent for several family lines. Approximately 3.7 percent, or 837 seedlings, were selected at harvesttime for increase in 10-hill rows and inclusion in 10 different tests in 1957 (see P. I. table 6) excluding 1,500 selections saved for vitamin C test at Cornell University, New York.

One of the most outstanding parents, as measured by the number of seedlings selected, was B 3139-24. About 7 percent of the total seedlings of the families in which this parent was a member were saved for future tests. Another good parent was B 3516-11 which had 5 percent of its seedlings saved. B 3139-24 is resistant to scab, verticillium wilt, ring rot, and virus Y; B 3516-11 is a late-blight and verticillium-wilt-resistant parent.

P. I. table 1.--Selections used successfully as parents at Beltsville, Md., 1956.

Variety or seedling	Parentage	Source	Maturity	Fertility	Skin	Color	Flesh	Late blight	Scab	Ring rot	Viruses	Leaf roll	Vert. wilt	Corky ring spot	Hopperburn	Net necrosis	Golden nematode	Spindle tuber
Ac.25953	(S.d. x S.a. x tub.) x (S. ch. x S.a. x tub.		2/	2/	2/	2/	2/	3/	4/									
Ac.25976		Germany	L	+	-	-	-	R ₃ M	-	-	-	-	-	-	-	-	-	-
Ac.25977		Scotland	L	+	-	-	-	R ₂ R ₃ M	-	-	-	-	-	-	-	-	-	-
Ac.26029		"	L	+	-	-	-	R ₁ R ₃ R ₄ M	-	-	-	-	-	-	-	-	-	-
Ac.26030	Ac. 25891 selfed- 3 NC-9 x B 922-3	Mexico	L	-	-	-	-	M	-	-	-	-	-	-	-	-	-	-
Ac.26032	"	"	L	+	-	-	-	M	-	-	-	-	-	-	-	-	-	-
Ac.26033	"	"	L	+	-	-	-	M	-	-	-	-	-	-	-	-	-	-
Ac.26035	3 NC-9 x B 922-3	"	L	+	-	-	-	M	-	-	-	-	-	-	-	-	-	-
TI-5	"	"	L	-	-	-	-	M	-	-	-	-	-	-	-	-	-	-
HSO-2	N.Y. seedling	W. Va.	-	-	-	-	-	R ₂ R ₄ M	-	-	-	-	-	-	-	-	-	-
ND 457-1	"	N. Y.	-	-	-	-	-	R ₁ R ₂ M	-	-	-	-	-	-	-	-	-	-
Cayuga	Sebago x Minn.92.36-5	U.S.D.A.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cherokee	Hindenburt x Katahdin	"	L	+	-	-	-	M	-	-	-	-	-	-	-	-	-	-
Delus	96-56 x 528-170	"	M	+	-	-	-	R ₁ M	-	-	-	-	-	-	-	-	-	-
Earlaine	Mohawk x 96-56	"	M	+	-	-	-	R ₁ M	-	-	-	-	-	-	-	-	-	-
Houma	I. Cobbler x 43055	"	E	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Katahdin	Chas. Downing x Katahdin	"	L	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kennebec	40568 x 24642	"	L	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Menoninee	B 127 x 96 -56	"	L	+	-	-	-	R ₁ M	-	-	-	-	-	-	-	-	-	-
Merrimack	R. Jubel x 44537	"	L	+	-	-	-	R ₁ M	-	-	-	-	-	-	-	-	-	-
Mohawk	96-56 x Saranac	"	L	+	-	-	-	R ₁ M	-	-	-	-	-	-	-	-	-	-
Ontario	Green Mt. x Katahdin	"	L	+	-	-	-	M	-	-	-	-	-	-	-	-	-	-
Record	Richter's Jubel x 44537	"	L	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rus. Burbank		"	L	+	-	-	-	R ₂ M	-	-	-	-	-	-	-	-	-	-
Saranac		"	L	+	-	-	-	R ₂ M	-	-	-	-	-	-	-	-	-	-
Sebago	President x Katahdin	"	L	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sequoia	Chippewa x Katahdin	"	L	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
96-56	Green Mt. x Katahdin	"	L	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
627-164	3895-13 x Earlaine	"	E	+	-	-	-	R ₁ M	-	-	-	-	-	-	-	-	-	-
792-88	Hindenburt x Katahdin	"	M	+	-	-	-	M	-	-	-	-	-	-	-	-	-	-
927-3	41956 x Earlaine	"	M	+	-	-	-	M	-	-	-	-	-	-	-	-	-	-
	AAP-9 x Katahdin	"	M	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Variety or seedling	Parentage	Source	Maturity	Fertility	Color	Late blight	Scab	Ring rot	Viruses	Leaf roll	Vert. wilt	Corky ring spot	Hopperburn	Net necrosis	Golden nematode	Spindle tuber
1241-90	Katahdin selfed	U.S.D.A.	L	+	W	W	-	-	R	-	-	-	-	-	-	R
47156	45208 x Earleine	"	M	+	Y	Y	-	-	R	-	-	-	-	-	-	-
B 24-58	Imperia x Earleine	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 24-78	"	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 294-38	Houma x 96-56	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 294-85	"	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 355-24	96-56 x Saranac	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 595-76	41956 x Cherokee	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 606-3	41956 x 96-56	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 606-37	"	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 922-3	"	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 922-6	TI-5 x B 355-24	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 922-9	"	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 929-32	792-88 x B 81-40	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 991-14	B 355-24 x B 81-40	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 2922-26	B 607-72 x B 598-29	"	E	+	W	W	-	-	R	-	-	-	-	-	-	-
B 2969-15	B 1153-10 x B 878-28	"	E	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3014-10	B 985-6 x B 929-6	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3097-82	Kennebec x B 991-3	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3139-24	B 607-56 x B 402-1	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3172-13	B 982-16 x B 991-13	"	E	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3209-35	Katahdin x B 2067-52	"	L	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3298-34	B 936-12 x B 2067-52	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3309-8	B 874-108 x B 2131-3	"	M	+	R	W	-	-	R	-	-	-	-	-	-	-
B 3403-10	B 922-3 x B 929-32	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3428-41	B 606-37 x B 929-32	"	E	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3454-5	B 2368-2 x B 2368-17	"	E	+	R	W	-	-	R	-	-	-	-	-	-	-
B 3556-12	B 595-76 x B 24-58	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 3604-19	Saranac x B 2395-14	"	M	+	W	W	-	-	R	-	-	-	-	-	-	-
B 4002-1	Craig's Defiance x 2201	Scotland	L	+	W	Y	-	-	R	-	-	-	-	-	-	-
B 4002-10	"	"	L	+	W	Y	-	-	R	-	-	-	-	-	-	-
B 4005-10	1673-24 x Profit	Netherland	L	+	W	Y	-	-	R	-	-	-	-	-	-	-
B 4005-78	"	"	L	+	W	Y	-	-	R	-	-	-	-	-	-	-
B 4005-102	"	"	L	+	W	Y	-	-	R	-	-	-	-	-	-	-
B 2067-52	Chipewa x B 381-2	U.S.D.A.	M	+	W	W	-	-	R	-	-	-	-	-	-	-

continued

P. I. table 1, continued.

Variety or seedling	Parentage	Source	Maturity	Fertility	Skin	Color Flesh	Late blight	Scab	Ring rot	Viruses X A Y	Leaf roll	Vert. wilt	Corky ring spot	Hopperburn	Net necrosis	Golden nematode	Spindle tuber
			2/	2/	2/	2/	3/	4/									
B 725-61	336-184 x Teton	Maine	-	-	W	W	-	-	R	-	-	-	-	-	-	-	-
B 902-2	B 488-7 x 157-9	"	-	-	W	W	-	-	R	-	-	-	-	-	-	-	-
B 3299-13	B 936-12 x Katahdin	"	-	-	W	W	-	-	-	-	-	-	-	-	-	-	-
B 3302-68	B 2113-9 x B 936-12	"	-	-	W	W	-	-	-	-	-	-	-	-	-	-	-
B 3626-13	B 595-76 x B 2067-52	U.S.D.A.	E	+	W	W	R ₁ M	-	R	-	-	R	-	-	-	-	-
B 3641-18	ND 457-1 x B 2067-52	"	E	+	W	W	-	-	-	-	-	-	-	-	-	-	-
B 3646-11	B 595-76 x B 2395-14	"	E	+	W	W	R ₁ R ₂ M	-	R	-	-	R	-	-	-	-	-
B 3652-11	792-88 x Cherokee	"	M	0	W	W	R ₁ M	-	R	-	-	R	-	-	-	-	-
B 3672-3	(Chacoense x Men.) x Cherokee	"	M	+	W	W	R ₁ M	-	R	-	-	R	-	-	-	-	-
B 3707-4	Ac. 25953 x Ac. 25959	"	M	+	W	W	R ₂ M	-	-	-	-	-	-	-	-	-	-
B 3720-9	Ac. 25953 x B 2997-9	"	E	+	W	W	R ₃ M	-	-	-	-	-	-	-	-	-	-
Artic Seedling		Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Knirk		"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22.47-2-50		"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1/ Genotypes and multiple gene resistances were checked by M. E. Gallegly, West Virginia.

2/ Symbols used:

- L - Late maturity
- M - Medium "
- E - Early "
- + - Fertile
- 0 - Unfertile
- R - Red
- W - White
- Y - Yellow

3/ R₁ - Genotype for late blight resistance

- R₂ - " "
- R₃ - " "
- R₄ - " "
- M - Multiple gene resistance

4/ R - Resistance to immunity rating for various factors

P. I. table 2.--Distribution of potato seed and new seedlings from greenhouse at Beltsville, Md., 1956.

Country or State	Cooperator	Number of progenies	Number of seedlings
Belgium	Y. Roland	1	-
Maryland	R. E. Webb	4	-
Mexico	John S. Niederhauser	29	2,820
Phillippines	Thomas L. York	20	2,489
Iowa	A. E. Kehr	13	1,413
Louisiana	T. P. Dykstra	12	1,892
Maine	R. V. Akeley	130	24,841
"	R. Bonde and G. W. Simpson	23	5,413
Ohio	J. P. Slesman	15	171
Wisconsin	E. D. Jones	47	7,058

P. I. table 3.--Distribution of named and numbered varieties to foreign countries.

Country	Cooperator	Number of varieties
Africa (So. Rhodesia)	Ministry of Agriculture	7
Australia	Department of Agriculture	2
Belgian Congo	INEAC Experiment Station	1
Brazil	Inst. Agri. de Estado de São Paulo	1
Canada	E. Campagna	1
"	C. C. Filman	1
"	G. R. Johnston	5
"	O. M. McConkey	1
"	G. A. Menzies	7
"	M. M. Parks	2
"	C. Penault	1
France	L. Riffault	1
"	" "	1
Germany	W. Brower	25
Italy	Ameliano Brandalini	10
Israel	Plant Introduction	4
Libya	Leonard H. Otto	4
New Zealand	C. M. Driver	24
Pakistan	A. R. Khan	8
Panama	Davis and Remon	9
Puerto Rico	Marco A. Tio	2
South Africa	L. L. Roux	1
Thailand	Plant Introduction	20
Uruguay	L. Ponce de Leon	9
Venezuela	P. J. Linares S.	6

P. I. table 4.--Distribution of named and numbered varieties to Territories and States.

Territory or State	Cooperator	Number of varieties
Alaska	C. H. Dearborn	4
California	P. P. Crowell	1
"	G. N. Davis	20
Colorado	W. C. Edmundson	25
Connecticut	A. Hawkins	17
"	P. Waggoner	2
Delaware	E. P. Brasher	14
Florida	A. H. Eddins	63
"	J. T. Waters	4
Georgia	J. E. Bailey	3
Idaho	J. G. McLean	908
Illinois	N. F. Oebker	1
"	J. P. McCollum	2
Indiana	N. K. Ellis	2
"	H. T. Erickson	92
Iowa	A. E. Kehr	132
Kentucky	Clyde Singletary	16
Maine	R. V. Akeley	23
Maryland	C. E. Cox	19
"	P. H. Heinze	6
Massachusetts	R. A. Mallany	8
"	R. W. Donaldson	16
Michigan	M. L. Anderson	2
"	J. L. Harrington	1
"	W. Hooker	111
"	I. R. Hunt	6
"	D. R. Isleib	2
"	R. S. Lincoln	1
"	E. J. Wheeler	1
Montana	H. N. Metcalf	7
Nebraska	H. O. Werner	2
New Jersey	J. C. Campbell	7
New York	M. W. Meadows	14
North Dakota	Wm. Hoyman	2
" "	Ben Picha	11
Ohio	John Bushnell	1
"	J. P. Slesman	19
Pennsylvania	J. S. Cobb	16
"	Harold Gregar	3
"	James Watts	1
Rhode Island	J. E. Sheehan	24
South Carolina	Wm. Epps	26
Texas	J. M. Coruthers	19
"	Harry Meyer	19
Virginia	F. S. Andrews	5
"	P. H. Massey, Jr.	14
"	M. M. Parker	1

continued

P. I. table 4, continued.

Territory or State	Cooperator	Number of varieties
Washington	S. B. Locke	11
"	C. L. Vincent	8
West Virginia	K. C. Westover	8
Wisconsin	E. D. Jones	298
"	L. R. Larson	20
"	G. H. Reiman	4

P. I. table 5.--Maturity and fertility data of seedlings grown in 10-hill rows on Chapman Farm in 1956.

Maturity classes	Seedlings		Fertility ^{1/} classes	Seedlings	
	No.	Pct.		No.	Pct.
Early	318	12.3	None	1,190	46.2
Medium	1,500	58.0	Slight	87	3.4
Late	592	22.8	Medium	273	10.6
Very late	178	6.9	Good	1,027	39.8
Total	2,588	100.0		2,577	100.0

^{1/} Based on the relative number of seedballs set in the field.

P. I. table 6.--A summary of single-hill seedlings grown on the Chapman Farm in 1956, showing the total number planted, grown, and selected in 1956; and the number of selections for future tests in 1957.

Planted	Grown	Selected	Late blight	Scab	Ring rot	Viruses			Leaf roll	Vert. wilt	Vitamin C	Golden nematode
No.	No.	No.	No.	No.	No.	A	X	Y	No.	No.	No.	No.
23,625	22,708	837	484	511	210	423	234	128	151	39	1,500	54

Aroostook Farm, Presque Isle, Maine

Weather conditions in Northern Maine for the 1956 growing season were unusual. May, June, July, and part of August were cool and wet. It was during the latter part of the growing season, when temperatures were high, that most of the increase in weight and size took place.

About 62 leading varieties and promising new selections were in the Aroostook increase plots. An additional 181 varieties and selections were increased on a smaller scale. Included in the variety increase were many foreign varieties such as Hindinburg, Jubel, Bintje, and Triumph; and many of the older American varieties such as Garnet Chili and American Giant.

A weekly spray consisting of Dithane and DDT was applied to all of the plots from June 1 to September 5. A Parathion and Dithane spray was used on July 12 and August 15. All of the yield trials were sprayed with sodium arsenite, a vine killer, on September 8, after a roto beater had been used on the plots.

Yield Tests

Eighteen early or medium maturing seedling potato varieties were compared in yielding ability with the check varieties Chippewa and Irish Cobbler. The data for this test is tabulated in P. I. table 7. The varieties are listed according to yield in bushels per acre. There are no significant differences in yield between the 7 top seedling varieties. B 3692-4, a medium maturing variety resistant to late blight, virus Y and virus A, ranked first in yield, but was only fair in dry-matter content. Irish Cobbler yielded 609 bushels of U. S. No. 1 potatoes per acre and ranked eighth in yield.

P. I. table 7.--Early and medium maturing variety test, Aroostook Farm, Presque Isle, Maine, 1956.

	U. S. No. 1 tubers per acre			
Variety	Per acre		Average weight	Solids
	Bu.	Pct.	Oz.	Pct.
B 3692-4	721	95	6.0	18.0
B 3725-1	714	97	7.0	17.2
B 3114-67	680	99	11.4	16.2
B 3696-13	656	96	6.3	17.9
B 3319-20	636	92	4.6	17.4
B 3653-15	631	93	5.3	19.1
B 3097-16	622	97	6.9	18.9
Irish Cobbler	609	95	6.2	20.0
B 3726-6	608	90	5.0	19.7
B 3697-3	606	90	4.4	17.9
B 3114-52	594	98	7.1	18.5
Chippewa	583	94	6.3	16.8
B 3654-1	573	96	5.6	17.4
B 3428-31	521	91	4.4	18.1
B 2922-26	469	93	5.1	17.5
CS 11888	452	94	4.7	18.5
CS 11889	450	95	4.7	18.6
B 3621-1	433	92	4.7	17.6
B 3653-4	431	93	5.3	17.5
L.S.D. .05 level	103			1.4

However, its dry-matter content of 20 percent was the highest of any entry in the test. B 3114-67 ranked third in yielding ability, but the average size of its U. S. No. 1 tubers was 11.4 ounces, and its dry-matter content only 16.2 percent, both undersirable characteristics. It is interesting to note that 99 percent of the total tubers of this selection were graded U. S. No. 1.

Ten late-maturing varieties were compared in yielding ability, solids content, and average size with Teton and Katahdin, (P. I. table 8). Although ranking second in yielding ability, Louisiana 1859 is the most outstanding variety because of its high solids content. The Louisiana selection 3769 ranked first in yielding ability; however, it ranked last in percentage of solids. La 4112 ranked third in yield, but its average tuber weight was over one-half pound. I 911-2 and B 2925-38 had the highest percentage solids, but were next to last and last, respectively, in yielding ability.

P. I. table 8.--Late maturing variety test, Arcostook Farm, Presque Isle, Maine, 1956.

Variety	U. S. No. 1 tubers per acre		Average weight		Solids
	Bu.	Pct.	Oz.	Pct.	
La 3769	775	97	6.9		15.5
La 1859	718	97	6.8		18.4
La 4112	625	98	8.9		17.7
Teton	624	97	6.7		18.5
B 3429-23	615	94	5.7		18.5
Katahdin	605	96	5.8		17.8
B 137-5	584	94	6.4		17.6
B 3614-8	566	95	5.7		19.0
B 3622-4	443	94	5.2		18.8
B 2345-42	441	91	6.2		16.8
I 911-2	344	86	4.1		19.4
B 2925-38	294	88	4.7		19.1
L.S.D. .05 level 87					1.6

Late Blight Injury as Reflected in Yields and Percentages of Solids

Six varieties in 1956 were exposed in 4 randomized blocks with 4 treatments to an epidemic of late blight. Approximately 1,100 pounds of fertilizer (10-15-15) was applied per acre. The field plot was sprayed at 7-day intervals throughout the growing season. The weather in northern Maine was not ideal for the spread of late blight, but a satisfactory epidemic did occur in mid-July from artificial inoculation on unsprayed susceptible Chippewas planted in rows spread at regular intervals within the plot.

The results in P. I. table 9 show a highly significant difference in the mean yields for treatments and varieties. Dithane and dithane + DDT sprays produced yields of 525 and 524 bushels of U. S. No. 1 potatoes per acre, whereas the water and DDT sprays produced only 373 and 360 bushels. The DDT treatment alone and with dithane had very little influence on yields. Apparently the aphid population did not build up to a critical point this year. A regular spray program with a good insecticide treatment should give such results. All varieties responded to the dithane treatments. Increases of 100 bushels per acre for Menominee and 200 for Saco were obtained with the dithane treatment as compared with the check.

P. I. table 9.--Reaction of 6 varieties to late blight as reflected in yields and percentage solids.^{1/} Aroostook Farm, Presque Isle, Maine., 1956.

Variety	Treatments, yield, ^{2/} and percentage solids ^{3/}													
	Water			DDT			Dithane			DDT + Dithane			Means	
	U.S.No.1	Solids		U.S.No.1	Solids		U.S.No.1	Solids		U.S.No.1	Solids		U.S.No.1	Solids
	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.
Katahdin	312	86	17.3	315	87	16.6	486	94	19.0	456	94	19.0	392	18.0
Sebago	328	88	18.0	288	85	17.2	482	92	19.1	476	94	18.5	393	18.2
Menominee	371	92	17.0	402	92	16.7	502	95	18.0	476	95	17.8	438	17.4
Kennebec	407	95	17.8	310	91	16.6	514	95	18.4	559	95	18.9	447	17.9
Merrimack	333	89	19.1	330	91	18.2	470	94	20.2	488	94	19.8	405	19.3
Saco	490	95	19.0	514	95	17.9	695	98	20.6	692	97	20.2	598	19.4
Means	373	91	18.0	360	90	17.2	525	95	19.2	524	95	19.0	445	18.3

1/ Based on specific gravity of tubers

2/ Difference between 2 variety means at .05 level, 30 bushels.

Difference between means of same variety for any 2 treatments, 16 bushels.

3/ Difference between 2 variety means at .05 level, 0.3%

Difference between means of same variety for any 2 treatments, 0.6%

The effect of treatments on dry matter was present again as in 1955. There were statistically significant differences in dry matter between varieties and between treatments. Controlling the spread of late blight on varieties with dithane keeps the foliage alive longer and in this instance may be responsible for more mature tubers, higher in total solids than those which were killed by late blight earlier in the season.

Dates of Seed Cutting for 8 Varieties ✓

Tests on dates of seed cutting were continued and enlarged in 1956. Other areas will also report on similar material grown and treated in Maine.

If a seed potato is properly cut, tuberized, and stored it should be about as valuable for planting as a whole tuber of the same size or one freshly cut at planting time. Also, its susceptibility to infection with black leg or other soil-borne diseases should not be any greater. If precut seed can be demonstrated as feasible, it would demand premium prices that are now paid for small whole seed for the same reasons.

Foundation seed of the 8 varieties was increased in Maine in 1955, early harvested, and dipped instantly in a solution of Orthocide before storage. On September 10 and at monthly intervals thereafter 2 sample bushels of each variety were cut into seedpieces sized from 1½ to 2 ounces. After the temperature dropped below 40°F. in the farm storage house the varieties were brought out into a workroom and warmed up (50° to 60° F.) for 2 days. All tuber samples were cut the first day and covered with moist burlap sacks for another day before they were returned to the storage bin, which had a winter storage temperature of 36° to 40°.

The yields and percentages of U. S. No. 1 tubers and of germination are given in P. I. tables 10 and 11. The only significant differences in these 2 tests occurred between varieties. Dates of cutting and dates x varieties were not significant. The mean germination or stand for all varieties was very good. The plots were examined twice for blackleg-infected plants, but none was found.

P. I. table 10.--Dates-of-seed-cutting for 4 late-maturing varieties as reflected in yields of U. S. No. 1 tubers per acre and percentage germination, Presque Isle, Maine, 1956.^{1/}

Seed cutting dates	Katahdin			Green Mountain			Sebago			Kennebec			Mean
	U.S.No.1		Germ.	U.S.No.1		Germ.	U.S.No.1		Germ.	U.S.No.1		Germ.	
	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.
Sept. 10	573	95	94	547	94	98	556	96	100	629	97	96	576
Oct. 10	557	97	97	532	96	98	579	96	96	670	98	96	584
Nov. 10	556	96	91	642	97	95	565	96	99	681	97	96	611
Dec. 10	548	96	99	566	96	96	562	96	94	692	97	99	592
Jan. 10	630	96	97	637	97	97	584	96	93	645	97	96	624
Feb. 10	560	95	95	605	96	95	539	95	97	696	98	100	600
March 10	662	96	97	643	96	98	531	96	93	708	98	97	636
April 10	627	94	99	632	95	92	512	96	94	600	96	98	593
May 11	667	97	99	637	95	97	568	96	96	688	96	100	640
Mean ^{2/}	598	96	96	604	96	96	555	96	96	668	97	98	

1/ Row spacing was 34", seed spacing 10". Approximately 1,100 pounds of a 10-15-15 fertilizer was applied per acre.

2/ L.S.D. .05 level between variety means = 36 bushels.

P. I. table 11.--Dates-of-seed-cutting for 4 medium to early-maturing varieties as reflected in yields of U. S. No. 1 tubers per acre and percentage germination, Presque Isle, Maine, 1956.^{1/}

Seed cutting date	Irish Cobbler			Cherokee			Chippewa			Pungo			Mean
	U.S.No.1		Germ.	U.S.No.1		Germ.	U.S.No.1		Germ.	U.S.No.1		Germ.	
	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.
Sept. 10	521	95	99	654	96	100	595	94	99	675	98	98	611
Oct. 10	530	94	100	655	96	99	529	95	99	652	97	96	591
Nov. 10	568	95	100	608	96	99	655	94	97	671	98	93	625
Dec. 10	533	94	97	642	96	99	604	95	97	655	98	97	608
Jan. 10	534	93	94	629	96	98	630	93	93	722	97	93	629
Feb. 10	561	95	98	619	94	100	615	93	95	705	98	98	625
March 10	545	93	97	656	96	94	608	92	98	735	98	96	636
April 10	533	94	100	642	96	97	622	94	96	683	98	97	620
May 11	523	92	100	667	96	97	603	94	97	699	97	99	623
Mean ^{2/}	539	94	98	641	96	98	607	94	97	688	98	96	

1/ See footnote 1, P. I. table 10.

2/ L.S.D. .05 level between varieties = 54 bushels.

Seed dehydration treatments on 3 varieties as reflected in yields of U. S. No. 1 tubers and percentage stands at Presque Isle, Maine, 1956.

The cost of handling and shipping and the performance of seed potatoes after the grower receives them are important to potato growers and shippers in the northern seed-producing areas of this country. With this in mind, it was decided to set up a pilot test of dehydrated seedpieces of 3 varieties at certain levels and to determine the effect on stand and yield.

Proper suberization and withdrawal of part of the water content of the cut seedpieces would lower the shipping, handling, and cutting costs to the table stock grower. Also, seedpiece rot after planting could be reduced and stands as good as those obtained from planting small whole tubers could occur.

P. I. tables 12 and 13 give the results of such a pilot test conducted in Maine. Results were erratic due to drying out too quickly of the seedpieces before they were properly suberized. Some rot occurred which resulted in poor stands and yields. It is interesting to note, however, that Kennebec produced 553 bushels of U. S. No. 1 tubers per acre under these conditions after shrinking its total seedpiece weight 34 percent. This yield is not significantly better than that of 523 bushels per acre for fresh-cut 2-oz. seedpieces, but it is greater by 30 bushels. The results indicate that dehydration of seedpieces may be feasible and practical if certain techniques are improved.

P. I. table 12.--Dehydration treatment of 100 seedpieces (2 os.) for 3 varieties planted at Presque Isle, Maine, 1956.

Treatment	Drying ^{1/} time	Delus	Sebago	Kennebec	Mean
	Hr.	Pct.	Pct.	Pct.	Pct.
A	None	100	100	100	100
B	30	67	72	68	69
C	72	60	64	66	65
D	98	52	58	54	55

^{1/} Drying temperature held at approximately 80 F.

Highly significant differences occurred between varieties, treatments, and treatments x varieties. .05 level = 47, 37, and 64 in that order.

P. I. table 13.--Dehydration treatment for 3 varieties as reflected in yields of U. S. No. 1 tubers and percentage germination, Presque Isle, Maine, 1956.^{1/}

Seed treatment	Delus			Sebago			Kennebec			Mean
	U.S.No.1		Germ.	U.S.No. 1		Germ.	U.S.No. 1		Germ.	
	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.
A	453	97	82	531	94	96	523	95	83	502
B	346	98	70	457	93	92	524	96	98	442
C	426	97	72	421	93	82	553	96	99	467
D _{2/}	275	99	38	299	95	60	475	97	81	350
Mean ^{2/}	375			427			519			

^{1/} See footnote 1 in P. I. table 10.

^{2/} L.S.D. .05 level between variety means 47 bushels, and between treatments 37 bushels.

Varietal Reaction to Net Necrosis

Fourteen potato varieties were tested for resistance to net necrosis as measured by yield and percentage of infected tubers. (P. I. table 14.) Alternate rows in the test were planted with tubers from leaf-roll-infected plants. On July 27 viruliferous aphids that had fed on leaf-roll-infected Katahdin plants were placed on the plants of each variety and on the adjacent leaf-roll-infected plots.

P. I. table 14,--Yields^{1/} of 14 potato varieties exposed to leaf roll in the field to test for net necrosis resistance.

Variety	U.S. No. 1 yield per acre		Total tubers examined	Net necrosis
	Bu.	Pct.	No.	Pct.
B 2368-4	636	97	306	0.0
927-3	607	88	500	0.0
Plymouth	573	96	377	50.9
B 73-3	569	97	315	62.2
B 926-9	550	96	238	29.0
Boone	539	96	380	10.5
Katahdin	533	94	418	1.2
Early Gem	528	93	367	8.4
Merrimack	520	94	413	0.0
B 595-76	509	92	416	0.0
Sebago	501	91	396	7.8
B 605-10	496	93	379	0.8
Delus	470	97	266	77.4
Russet Burbank	377	33	289	52.2
L.S.D. .05 level	75			

^{1/} Yield of U. S. No.1 potatoes, 1 7/8 inches minimum size.

The yield trial was harvested and graded on September 17, and the U. S. No. 1 tubers were placed in a common storage. On December 12 the stored tubers of each variety were cut and graded for percentage of net necrosis.

There were no significant differences in yield between the 4 highest ranking varieties. However, B 73-3 and Plymouth also ranked second and third, respectively, in percentage of net necrosis. The highest percentage of net necrosis (77.4) was found in Delus. Delus ranked second highest in percentage of net necrosis in 1955.

The most outstanding variety in the test is Seedling 927-3 because of its yielding ability and high degree of resistance to leaf roll. Although B 2368-4 ranked first in yield and was free of net necrosis, the majority of its tubers were rough and misshapen.

The percentage of net necrosis was higher this year than in 1955 for all varieties tested both years except for B 605-10, which was 0.2 percent higher in 1955. Katahdin was free of net necrosis in 1955. In 1956, 1.2 percent of its tubers were necrotic.

Scab Resistance

A total of 371 seedling varieties from 37 family lines were tested for scab resistance in scab-infested soil on Aroostook Farm. The results are tabulated in P. I. table 15. The majority of the seedlings came from selections made in the 10-hill increase plots at Chapman Farm in 1955. About 42 percent of the seedling varieties had from 1 to 20 percent of their surface area covered with scab, and about 34 percent of the tubers had large superficial pustules. In comparison, approximately 90 percent of the Green Mountain checks had from 41 to 60 percent of their area covered with scab, and 88 percent of the tubers had large deep rough pustules.

P. I. table 15.--Summary of the data observed from the scab tests on Aroostook Farm, Presque Isle, Maine, 1956.

Material tested	Total number	Surface area covered ^{1/}					Type pustule ^{2/}			
		T	1	2	3	4	1	2	3	4
Seedling varieties	371	120	158	63	25	5	88	126	108	49
Gr. Mountain check	371	0	1	23	334	13	0	0	46	325

^{1/} Surface area covered	^{2/} Type of pustule
T = Less than 1 %	1 = Small, superficial
1 = 1 to 20%	2 = Large, but still superficial
2 = 21 to 40%	3 = Large rough pustules
3 = 41 to 60%	4 = Large rough pustules, deeply pitted.
4 = 61 to 80%	

Several older parents such as Ontario, B 2331-5, B 2359-84, B 2834-3, B 3097-82, and B 3139-24 had only a trace of type 1 pustules. All the Green Mountain checks had from 41 to 60 percent of their surface covered with the deeply pitted type 4 pustules.

The effect of date-of-planting on scab incidence for 3 varieties has been observed for the past 2 years in Maine. Results from these 2 years indicate that late-planted potatoes have less scab.

Variety Test in Wilt-Infested Soil R. V. Akeley, A. E. Schark, and R. Bonde

Seventeen seedling or named varieties were tested for resistance to verticillium wilt on infested soil at Caribou, Maine. Seedlings 792-94, 792-88 and 41956, with less than 10 percent infection, were the most resistant varieties. These 3 seedling selections ranked lowest in wilt infection in 1954, 1955, and 1956. As in previous years, there was little or no correlation between yield and disease incidence. More than 40 percent of the hills of the three top-ranking varieties were infected with wilt. B 926-9 was the most highly infected selection (92 percent) yet it ranked sixth in yield. There were no significant differences in yield among the top 5 varieties Ontario, Houma, Katahdin, Plymouth, and Boone (P. I. table 16). Ontario and Houma, the two highest yielding varieties, were among the 4 lowest varieties in percentage of solids. There is some indication that disease incidence

and percentage solids are inversely related. Partial correlation coefficients were determined for yield, dry-matter content, and disease percentage. A highly significant negative correlation was observed between dry-matter content and percentage of wilt infection. Two of the most resistant selections, 41956 and 792-94, were the two highest varieties in percentage solids for the years 1955 and 1956. The most susceptible selection, B 926-9, was the fifth lowest variety in percent solids. B 2971-14, a leaf-roll-resistant seedling, appears to be an exception to the relationship. It was 73 percent wilt-infected and contained 18.4 percent solids.

P. I. table 16.--Reaction to verticillium wilt as reflected in yields and percentage solids of 17 varieties of potato grown in wilt-infested soil at Caribou, Maine, 1956.

Variety	Hills infected with wilt	U. S. No. 1 yield per acre		Average weight per tuber	Solids
	Pct.	Bu.	Pct.	Oz.	Pct.
Ontario	44	795	94.5	6.8	16.3
Houma	56	776	94.7	7.3	16.1
Katahdin	43	744	97.7	9.1	17.8
Plymouth	30	717	98.3	9.6	17.2
Boone	18	710	96.2	9.2	16.4
B 926-9	92	698	97.1	8.1	16.4
927-3	41	687	92.2	6.0	17.7
41956	8	672	92.1	6.0	19.1
B 595-76	21	665	95.5	7.6	17.6
Russet Burbank	49	651	93.0	8.3	16.7
792-88	8	630	89.9	5.6	17.4
B 73-3	48	627	90.3	9.4	17.5
792-94	2	626	92.0	5.7	18.8
Menominee	70	580	94.5	7.2	15.2
B 579-3	32	534	97.4	6.7	18.7
B 2971-14	73	444	92.8	5.3	18.4
B 3299-17	67	444	96.0	6.7	16.1
L.S.D. .05 level	8	94			1.6

Verticillium Wilt Resistance
R. V. Akeley, A. E. Schark, and R. Bonde

The 1956 verticillium wilt test included 382 selections representing 26 family lines grown on the Ashby Farm at Caribou, Maine. P. I. table 17 summarizes the results obtained. The level of infestation, as measured by the check variety Cherokee, is at least as great this year as last. In both years, Cherokee was 100 percent infected. About 21 percent of the total selections tested from family lines and about 29 percent of the breeding material selections were free of wilt infection. The percentage of hills infested with wilt ranged from 0 to 100 percent. B 3952 was the only family completely free of wilt symptoms. The 3 check varieties used this year were planted at intervals of 25 rows throughout the plot. Cherokee continued to be used as a susceptible check. Houma and Katahdin

were added as moderately resistance checks. The breeding material tested consisted mostly of seedling varieties used as parents in the breeding program. Several new seedlings with wilt resistance combined with other disease-resistant factors were selected for future parents and testing.

P. I. table 17.--Verticillium wilt resistance test, 5-hill plots, on the Ashby Farm, Caribou, Maine, 1956.

Pedigree number	Parentage	Select-ions tested	Selections			Reading based on total hills		
		No.	No.	Pct.	Total	Infected	Pct.	
B 3818	(X792-88) x B24-58	56	47	84	280	139	50	
B 3819	(X792-94 x " "	29	24	83	145	69	48	
B 3828	Houma x Aquila	33	31	94	165	100	61	
B 3829	" x Katahdin	16	12	75	80	38	47	
B 3837	B595-76 x B294-38	16	16	100	80	55	69	
B 3838	" x B2359-84	13	9	69	65	30	46	
B 3871	" x B3139-24	14	13	93	70	27	39	
B 3905	(X792-88 x B2067-52	6	4	67	30	9	30	
B 3906	B1268-1 x (X792-94)	15	7	47	75	14	19	
B 3907	" -46 x Katahdin	4	1	25	20	3	15	
B 3908	" -46 x (X792-94)	18	7	39	90	10	11	
B 3909	Ontario x B3139-24	4	2	50	20	7	35	
B 3911	B595-76 x B1268-26	3	3	100	15	8	53	
B 3912	(X792-88) x " -35	10	7	70	50	11	22	
B 3913	(X792-94) x " -26	11	6	55	55	10	18	
B 3914	B1268-45 x Katahdin	2	2	100	10	9	90	
B 3922	(X792-88) x B3139-24	18	12	67	90	21	23	
B 3937	Houma x Liberator	5	4	80	25	7	28	
B 3938	Katahdin x " "	1	1	100	5	1	20	
B 3950	B595-76 x Ac.25976	1	1	100	5	5	100	
B 3952	(X792-88) x " "	3	0	0	15	0	0	
B 1454	Earlaine selfed	63	58	92	315	171	54	
B 1455	Katahdin " "	15	12	80	75	27	36	
B 1456	Saranac " "	2	2	100	10	5	50	
B 1457	Teton " "	13	11	85	65	26	40	
B 3839	B 595-76 x B 3299-13	11	11	100	55	30	55	
Total for 26 family lines		382	303	79	1910	744	39	
Cherokee check		17	17	100	85	67	78	
Houma " "		17	13	76	85	35	40	
Katahdin " "		17	13	76	85	25	29	
Breeding material		17	5	29	85	13	15	

Late Blight Resistance
R. W. Buck, Jr., and R. V. Akeley

During October 1956, 8,334 seedlings from 30 crosses and 3 selfed lines were inoculated with zoospores from 4 races of Phytophthora infestans. One or both of the parents were immune from one or more of the races of P. infestans.

The data obtained from this test are summarized in P. I. table 18. Of the 8,334 seedlings inoculated, 4,768, or 57.2 percent, survived.

P. I. table 18.--Summary of data obtained from late blight inoculation test of seedlings, 1956.

	Seedlings inoculated	Seedlings infected		Seedlings surviving	
		No.	Pct.	No.	Pct.
30 crosses	8,053	3,336	41.4	4,717	58.6
3 selfed lines	281	230	81.8	51	18.2
	8,334	3,566	42.8	4,768	57.2

In addition to the seedlings mentioned above, the progenies of 2 crosses between (*S. demissum* x diploid species) x Katahdin and of one cross [*(S. demissum* x diploid species) x Katahdin] x Kathadin were screened. Several resistant seedlings were selected for further backcrossing with the cultivated sorts.

Solanum Species and Hybrids R. W. Buck, Jr.

Several species and interspecific hybrids were grown at Beltsville, Md., in 1956, for crossability and cytological investigations.

A total of 225 crosses, 190 of which were interspecific, were attempted between diploid species and clones. Seed was obtained from 120 of these crosses. Eighty-nine were interspecific. F_1 seed was obtained from 13 tetraploid x diploid pollinations.

The majority of the F_1 diploid interspecific hybrids were completely male sterile. However, the majority set seed when used as the female parent and backcrossed to one or both parents.

Thirty-seven artificial tetraploids produced from diploid species and interspecific hybrids were selfed and pollinated with Katahdin pollen. Twenty-seven produced seed upon selfing and 16 produced seed when crossed with Katahdin. Hybrids belonging to the series *Pinnatisecta* and *Cardiophylla* failed to produce seed when crossed with Katahdin.

Seed was obtained from several crosses involving tetraploid hybrids between late-blight-resistant clones of *S. demissum* and diploid species and cultivated varieties.

Potato Disease Investigations

R. E. Webb, E. S. Schultz, Muriel O'Brien, R. V. Akeley,
R. W. Buck, Jr., and Allen Schark

Late Blight Resistance

Ten varieties and 743 selections were tested for relative resistance to late blight in the greenhouse and under field conditions in 1956. Table 1 summarizes the results of the field test.

The 1956 season generally was only moderately favorable for late blight infection and spread of the organism. However, there occurred short periods in which there were abundant sporulation, dissemination and re-infection of susceptible plants. This offered an opportunity to study the relative level of multiple gene resistance of parental material and progenies. Field evaluation of multiple gene resistance of certain parental types correlated closely with an evaluation made in the greenhouse by M.E. Gallegly of West Virginia.

Isolates of late blight sampled from the late-blight screening plot at weekly intervals indicate that within 2 weeks after inoculation with the O race more virulent races may be indentified. Similarly, preliminary results indicate that more virulent races may arise on race-O-infected plants growing on a well-isolated dump-heap.

Race 1, 3, 4 of late blight has been isolated from infected plants in Aroostook County, Maine. This is a total of 11 races identified in that area.

Virus X Resistance

Three hundred seventy-four potato selections were screened for immunity from virus X. Table 2 summarizes the test. These results indicate the large percentage of immune clone selections expected from parents which are immune from virus X. Many of the parents are immune from or highly resistant to other potato diseases.

Recent tests indicate that the aerial-tuber-reaction test for potato seedling immunity from virus X is most efficient under short days and moderately low temperature. In 3 separate trials, Green Mountain scions (X-infected) were grafted to seedling 41956 (X-immune) and placed under 8-, 12- and 16-hour days at temperature of 65° - 70° F. Aerial tubers formed on approximately 90 percent of the scions under the 8-hour day, and less than 50 percent under the 12- and 16-hour day. All scions wilted and died rapidly without aerial tuber formation under a 12-hour day at a temperature of 70° - 76° F. These results confirmed the observation that this technique was relatively ineffective in detecting X-immune seedlings during the summer on Aroostook Farm, Maine.

Webb table 1.--Reaction of potato selections to late blight in 1956.

Pedigree	Parentage	Number of selections	No. selections in class <u>1/</u>					
			1	2	3	4	5	6
B 3779	B 24-78 x Cherokee	52	-	3	12	26	10	1
B 3801	B 606-37 x B 24-58	11	-	-	3	5	2	1
B 3811	B 2966-6 x "	34	-	-	8	16	10	-
B 3813	B 24-58 x 3VW-9	37	18	-	3	8	6	2
B 3817	B 779-1 x B 24-58	53	-	-	18	17	17	-
B 3832	B 294-38 x B 3139-24	26	-	-	-	9	8	9
B 3837	B 595-76 x B 294-38	11	-	-	-	6	5	-
B 3838	" x B 2359-85	13	-	-	1	5	6	1
B 3839	" x B 3299-13	8	-	-	-	3	4	1
B 3840	B 606-37 x B 2359-84	3	-	-	1	-	2	-
B 3853	B 991-14 x Saranac	8	-	-	4	1	3	-
B 3854	" x Teton	10	-	-	2	5	3	-
B 3855	B 2935-7 x B 3021-3	6	-	-	-	4	2	-
B 3857	Saranac x B 929-32	20	-	-	7	7	6	-
B 3858	B 344-24 x B 2919-1	7	-	-	5	2	-	-
B 3859	" x B 3167-28	16	-	-	1	10	5	-
B 3860	B 607-56 x B 2968-7	40	-	-	14	18	7	1
B 3861	B 931-2 x 96-56	4	-	-	-	2	2	-
B 3862	B 3160-12 x B 355-24	16	-	-	6	8	2	-
B 3864	3XE-1 x B 355-24	11	4	-	2	3	2	-
B 3868	3VW-9 x "	7	4	-	1	2	-	-
B 3869	B 355-35 x Teton	9	-	-	1	3	5	-
B 3870	Katahdin x B 355-24	1	-	-	-	1	-	-
B 3871	B 595-76 x B 3139-24	14	-	-	2	10	2	-
B 3872	B 606-37 x "	21	-	-	8	8	5	-
B 3876	B 3097-82 x "	33	-	4	6	10	12	1
B 3879	Ac.25953 x B 355-24	4	1	-	1	2	-	-
B 3893	B 2997-9 x 2131-3	11	-	1	3	7	-	-
B 3894	B 3114-12 x B 2997-9	3	-	-	2	1	-	-
B 3900	B 2331-5 x B 3139-24	5	-	-	-	3	2	-
B 3909	Ontario x "	4	-	-	1	2	1	-
B 3911	792-88 x B 1268-38	3	-	-	-	3	-	-
B 3920	Kennebec x B 1172-16	22	-	-	3	5	12	2
B 3921	627-164 x Cherokee	2	-	-	-	2	-	-
B 3944	[1673 x 2201(182)] x Merrimack	36	-	-	22	9	5	-
B 3945	[1673 x 2201(85)] x "	14	-	-	8	5	1	-
B 3947	Katahdin x Ac.25976	2	2	-	-	-	-	-
B 3948	Earlaine x "	7	7	-	-	-	-	-
B 3950	B 595-76 x "	1	1	-	-	-	-	-
B 3955	Ac.25953 x Cherokee	2	2	-	-	-	-	-
B 3956	" x Katahdin	9	9	-	-	-	-	-
B 3957	" x Teton	6	6	-	-	-	-	-
B 3958	" x B 2938-22	4	4	-	-	-	-	-
B 3959	" x 3XE-1	4	4	-	-	-	-	-
B 3960	" x Ac.25976	8	8	-	-	-	-	-
B 3961	Ac.25955 x B 922-3	2	2	-	-	-	-	-
B 3962	" x B 2938-22	2	2	-	-	-	-	-
B 3963	" x Ac.25976	1	-	-	-	-	1	-

continued

Webb table 1, continued.

Pedigree Parentage	Number of selections	No. selections in class ^{1/}					
		1	2	3	4	5	6
B 3964 Ac.25966 x B 929-32	5	5	-	-	-	-	-
B 3965 Ac.25975 x 96-56	1	-	-	-	1	-	-
B 3969 HIM-1 x Saranac	1	1	-	-	-	-	-
B 3970 " x B 929-32	2	2	-	-	-	-	-
B 3971 HLD x "	1	1	-	-	-	-	-
B 3974 3VW-9 x Katahdin	2	2	-	-	-	-	-
B 3975 " x 96-56	1	1	-	-	-	-	-
B 3976 " x B 355-24	3	3	-	-	-	-	-
B 3977 " x B 2968-31	6	6	-	-	-	-	-
B 3978 " x Ac.25953	3	3	-	-	-	-	-
B 3979 " x Ac.25955	1	1	-	-	-	-	-
B 3980 " x Ac.25976	7	7	-	-	-	-	-
B 3982 3XE-1 x 3VW-9	7	7	-	-	-	-	-
B 3983 " x Katahdin	7	7	-	-	-	-	-
B 3984 " x B 922-3	4	4	-	-	-	-	-
B 3985 " x B 929-32	2	2	-	-	-	-	-
B 3986 " x Ac.25953	1	1	-	-	-	-	-
B 3987 " x Ac.25976	3	3	-	-	-	-	-
B 3988 Katahdin x Ac.25949	3	3	-	-	-	-	-
B 3989 B 922-3 x "	6	4	-	2	-	-	-
B 3990 B 24-58 x "	1	1	-	-	-	-	-
B 1456 Saranac selfed	2	-	-	1	1	-	-
B 1461 B 355-24 "	1	-	-	1	-	-	-
B 1471 B 2098-5 "	3	-	-	1	1	1	-
B 1477 B 3167-28 "	3	-	-	-	3	-	-
B 1483 Ac.25953 "	2	2	-	-	-	-	-
B 1268-26	1	2	-	-	-	1	-
Cherokee	1	-	-	1	-	-	-
Kennebec	1	-	-	1	-	-	-
Katahdin	1	-	-	-	-	1	-
Teton	1	-	-	-	-	1	-
Houma	1	-	-	-	-	1	-
Ontario	1	-	-	1	-	-	-
R. Burbank	1	-	-	-	-	1	-
Saranac	1	-	-	-	1	-	-
Earlaine	1	-	-	-	-	-	1
*792-88	1	-	-	-	1	-	-
Aquila #6	1	-	-	-	1	-	-
B 294-38	1	-	-	-	-	-	1
B 606-37	1	-	-	-	-	-	-
B 607-56	1	-	-	1	-	-	-
B 922-3	1	1	-	-	-	-	-
B 926-32	1	-	-	1	-	-	-
B 931-2	1	-	-	-	1	-	-
B 2067-52	1	-	-	-	-	1	-
B 24-58	1	-	-	-	-	1	-
B 991-14	1	-	-	1	-	-	-

continued

Webb table 1, continued.

Pedigree	Parentage	Number of selections	No. selections in class ^{1/}					
			1	2	3	4	5	6
B 1172-16		1	-	-	-	-	1	-
B 2098-5		1	-	-	-	1	-	-
B 2131-3		1	-	-	-	1	-	-
B 2331-5		1	-	-	-	1	-	-
*96-56		1	-	-	1	-	-	-
B 2919-1		1	-	-	1	-	-	-
B 2962-6		1	-	-	-	1	-	-
3XE-1		1	1	-	-	-	-	-
BVW-9		1	1	-	-	-	-	-
3NC9		1	1	-	-	-	-	-
B 2938-22		1	1	-	-	-	-	-
NDB 3801-28		1	-	-	-	-	1	-
Ac.25975		1	-	-	1	-	-	-
Ac.25976		1	1	-	-	-	-	-
X 627-164		1	-	-	-	-	1	-
B 2359-84		1	-	-	-	-	1	-
B 3299-13		1	-	-	-	-	1	-
Ac.25955		1	1	-	-	-	-	-
HSO-2		1	1	-	-	-	-	-
Ac.25953		1	1	-	-	-	-	-
OB 3131-1		1	-	-	-	-	1	-
B 355-24		1	-	-	1	-	-	-
B 3968-7		1	-	-	-	1	-	-
B 2997-9		1	-	-	-	1	-	-
B 3097-82		1	-	-	1	-	-	-
B 3139-24		1	-	-	1	-	-	-

^{1/} Readings taken 3 weeks after inoculation.

Rating system

- 1 - Free of late blight.
- 2 - Occasional lesion.
- 3 - 1/2 of foliage attacked.
- 4 - 2/3 of foliage attacked.
- 5 - All but a few leaves dead.
- 6 - All leaves dead.

Virus Y Resistance

Approximately 1,150 selections were infested with virus-Y viruliferous aphids (*Myzus persicae* Sulz.) in 3 plant lots under field conditions in 1956. Four-hundred sixty-six selections (table 3) were included in the test for the first time. The remaining 666 selections had failed to become infected in a similar test in 1955.

Webb table 2.--Reaction of potato selections to virus X.

Pedigree	Parentage	No. Clones	No. Sus.	No. Res.
B 3916	B 606-37 x B 2067-52	7	4	3
B 3924	B 982-11 x ND457-1	8	4	4
B 3925	B " -23 x B 3209-35	7	5	2
B 3926	B 1172-16 x Katahdin	15	15	0
B 3950	B 595-76 x Ac.25976	1	0	1
B 3952	B 792-88 x "	3	1	2
B 3984	3XE-1 x B 922-3	4	4	0
B 1268-1	Katahdin selfed	1	1	-
B " -26	" "	1	1	-
B " -38	" "	1	1	-
Cherokee		1	1	-
792-88	41956 x Earline	1	-	1
" -94	" "	1	-	1
96-56	3895-13 x "	1	1	-
B 606-37	41956 x (X96-56)	1	-	1
B 799-1		1	1	-
927-3		1	1	-
B 931-2	B 355-24 x (X792-94)	1	1	-
B 982-11		1	1	-
B 2067-52	Chippewa x B 381-2	1	1	-
NDB 3081-2R		1	1	-
ND457-1	ND seedling	1	1	-
B 3299-13		1	1	-
B 3139-24		1	1	-
X125.52	Wis. selection	1	1	-
X131.52	" "	1	-	1
X137.52	" "	1	-	1
X141.52	" "	1	-	1
X143.52	" "	1	-	1
B 3801	B 606-37 x B 24-58	11	5	6
B 3817	B 779-1 x "	53	25	28
B 3818	B 792-88 x "	56	29	27
B 3819	B " -94 x "	29	17	12
B 3837	B 595-76 x B 294-38	16	7	9
B 3838	B " x B 2359-84	13	6	7
B 3839	B " x B 3299-13	11	2	9
B 3940	B 606-37 x B 2359-84	3	1	2
B 3861	B 931-2 x 96-56	4	2	2
B 3871	B 595-76 x B 3139-24	14	5	9
B 3872	B 606-37 x "	21	14	7
B 3897	NDB 3081-2R x B 2997-9	13	11	2
B 3903	B 792-88 x B 2067-52	6	1	5
B 3906	B 2168-1 x B 792-94	15	9	6
B 3908	B 1268-46 x B 972-94	18	5	13
B 3911	B 595-76 x B 1268-26	3	2	1
B 3912	B 792-88 x " -38	10	3	7
B 3913	B " -94 x " -26	11	6	5

Table 3 summarizes the results of the first year test. Approximately 26 percent of the selections failed to express current-season symptoms of infection. Of the selections from B 2067-52, 91 percent did not show symptoms. When this parent was used in combination with other parental types, the progenies showed wide differences in susceptibility to virus Y (tables 3 and 4).

Webb table 3.--Reaction of potato selections to aphid-inoculation with virus Y in 1956.

Pedigree	Parentage	Number selections	Number susceptible	Number not showing symptoms
B 3803	B 2067-52 x B 24-58	21	20	1
B 3807	B 2944-65 x B 2067-52	51	48	3
B 3814	B 24-58 x "	29	29	0
B 3822	X927-3 x "	44	36	8
B 3833	B 294-38 x B 2209-25	31	18	13
B 3839	ND457-1 x B 294-38	54	47	7
B 3835	" x B 2359-84	40	37	3
B 3836	" x B 2938-22	30	27	3
B 3849	B 2834-3 x B 3136-6	13	12	1
B 3905	B 792-88 x B 2067-52	6	5	1
B 3916	B 606-37 x "	7	4	3
B 3917	Katahdin x "	9	5	4
B 3918	Ac.25949 x "	6	6	0
B 3920	Kennebec x B 1172-16	22	20	2
B 3924	B 982-11 x ND457-1	8	8	0
B 3925	B " -23 x B 3209-35	7	3	4
B 3926	B 1172-16 x Katahdin	15	7	8
B 3961	Ac.25955 x B 922-3	2	2	0
B 3989	B 922-3 x Ac.25949	6	5	1
B 1466	B 2067-52 selfed	65	6	59

Webb table 4.--Summary of a 2-year test of selected progenies for resistance to virus Y.

Pedigree	Parentage	1955 Number		1956 Number	
		Tested	Resistant	Tested	Resistant
B 3618	B 1268-26 x X792-94	30	19	19	9
B 3626	B 593-76 x B 2067-52	21	6	6	3
B 3627	B 606-37 x "	22	17	17	10
B 3628	X792-88 x "	18	2	2	1
B 3629	B 2067-52 x B 2968-31	13	9	9	8
B 3630	B 2068-23 x B 2067-52	17	0	17	14
B 3631	Katahdin x "	32	24	24	17
B 3641	ND457-1 x "	22	16	16	13
B 1434	B 2067-52 x "	27	27	27	25
B 1435	B 2068-23 x	20	17	17	14

Table 4 shows the reaction of selected progenies to infestation with virus-Y viruliferous aphids for 2 successive seasons. Each year all susceptible check plants (Green Mountain) developed symptoms under conditions of the test. These results indicate that a high level of field resistance to virus Y exists in certain parental types.

Virus A Resistance

Approximately 500 seedling varieties which had been inoculated with virus-A viruliferous aphids were indexed to Green Mountain for diagnosis of infection. Approximately 38 percent were infected under field conditions. In the greenhouse, 44 percent proved to be graft-immune from virus A. The results of reinoculating graft-susceptible clones with viruliferous aphids indicated that approximately 11 percent were highly resistant to or immune from aphid infection with virus A.

Verticillium Wilt Resistance Tests

Approximately 95 percent of the seedlings surviving the greenhouse test for evaluating resistance to Verticillium albo-atrum survived in soil heavily infested with the organism (table 5). This technique is being used to evaluate the resistance of progenies of selected parental material. This method has been used with excellent results in evaluating the wilt resistance of varieties and selections under greenhouse conditions. An abstract of this technique has been published in the American Potato Journal.

Table 5.--Reaction of seedling progenies when inoculated with Verticillium albo-atrum.

Pedigree	Parentage	Greenhouse			Field
		Seed	Seed	Res.	Surv. in
		inoc.	surv.	Pct.	infested soil
		No.	No.		No.
B 4218	792-94 x B 3139-24	196	11	5.6	11
B 4219	" x B 2962-6	111	1	.9	1
B 4220	" x Katahdin	196	65	3.2	65
B 4221	B 24-28 x B 3195-3	202	2	.9	2
B 4222	B 3195-3 x B 355-24	183	4	2.2	4
B 4223	B 56-11 x B 3139-24	207	81	39.1	79
B 4224	792-88 x 1376-2	166	5	3.0	5

Leaf Roll Resistance

Five varieties and 3 leaf-roll-resistant selections were planted in replicated plots and exposed to leaf-roll-viruliferous aphids June 27. Records of current-season infections were taken during the last week in August. Table 6 summarizes the results.

Webb table 6.--Reaction of 5 varieties and 3 seedlings to leafroll.

Variety	Plants inoculated	Plants showing current-season symptoms
	No.	No.
X927-3	100	1
B 2834-3	100	9
B 2759-5 <u>1</u> /	20	2
Katahdin	20	100
Houma	20	100
Green Mountain	20	100
Burbank	20	100
Sequoia	20	49

1/ 5 plants 1 plot

Leafroll-infected plants of seedlings X927-3, B 2834-3, B 24-58 and Green Mountain were used as sources of inoculum in isolated leafroll-spread plots. Spread of the virus was very low when infected plants of X927-3 were inter-planted in plots of healthy X927-3 and Green Mountain plants. Infected plants of B 2834-3 appeared also to be a poor source of inoculum, while plots containing diseased plants of B 24-58 showed considerable spread of the virus.

COLORADO

Potato Seedling and New Variety Testing at
Fort Collins, Colorado, 1956
C. W. Frutchey, A. M. Binkley and L. A. Schaal

144 potato varieties were planted on the Horticulture Experimental farm 2 miles north of the traffic circle on highway 87. Size of plot was 11 or 12 acres. The quantity planted varied considerably depending on how many times the varieties had been tested. Some of them have been in the test plot for 5 years, while 101 others were tested for the first time in 1956. Planting started May 4 and was completed May 7. All the varieties tested in 1955 were sized over the sorter, and the different sizes were planted separately, as indicated on the planting chart. The 1 1/2-inch to 2 1/4-inch size were planted as one drops; the 2 1/4-inch to 2 1/2-inch size were split into 2-piece units; those above 2 1/2 inches and up to 10 ounces were quartered into 4-piece units, and the oversize and odd-shaped tubers were cut as regular seedpieces and planted in mass.

The potatoes were planted on 1955 bean ground that had been heavily manured the year before. No commercial fertilizer was added at planting time. A portion of the field received a light application of anhydrous ammonia in the irrigation water later in the summer. Cultivating was the standard practice for potatoes, and irrigation was as often as needed to keep the soil moist. The insect-control program was considerably more intense than normal. Both wet spray and dust were used and 10 or 12 applications were made in an effort to prevent the usual heavy spread of virus diseases.

Growing conditions were good at planting time, and nearly all the varieties came up in the minimum of time. Some of the earlier and more vigorous ones emerged as much as 2 weeks ahead of the slower ones. Considerable virus disease was expected, since all the older varieties were indexed in the winter test, and most of them showed heavy infection. Also, tuber symptoms in the varieties newly acquired from the breeding station at Greeley indicated a high percentage infected with either spindle tuber, leafroll, or both. Consequently, roguing began when some of the vines were 6 inches tall and continued well into the summer. The extent of virus disease present varied from 2 or 3 percent to nearly 100 percent in some of the new varieties. Testimony to this is the fact that 91 of a total number of 101 of the new small-lot varieties were rogued out before they were 12 inches tall. Also, several of the older varieties were rogued completely out during the summer.

In addition to roguing, hill selections were made of the older more promising varieties early in August. Of the larger lots 200 hills were dug. In those lots only 2 years old, 50 hills were dug. These will be indexed during the coming winter either in the greenhouse or in the South.

Harvesting began September 15 and was completed September 20. Many of the varieties that were retained during the summer were discarded at harvesttime. Forty-seven varieties were harvested. Of these, 23 are in storage in the potato cellar on the campus, and the remainder were discarded as of no value and sold as table stock direct from the field. They were all examined for tuber type, tuber size, misshapened tubers, sunburn, scab, maturity, skin color, skin toughness, smoothness of skin, yield, internal discoloration and specific gravity. Three samples of each variety were measured for specific gravity and an average taken. Unless they were particularly outstanding in other respects, the white varieties were discarded if the specific gravity was less than 1.085, and they were discarded regardless of how good the other qualities were, if the specific gravity was less than 1.080. The specific gravity was noted on all red varieties as well, but they were not discarded on low specific gravity readings alone.

Several of the older lots are in fairly large quantities and some of them have been increased privately in 1956. This should be done again in 1957, of all the worthy lots that are in fairly large amounts. They should be grown particularly in the Gilcrest area, but effort should be made to get them in fairly large acreages and not distribute them to too many people to grow in small patches. These larger lots are: 12,240, 13,222, 11,889, 11,012, 11,918, 13,153, 13,178.

A few of the smaller lots will undoubtedly be discarded during this winter, but all lots worthy of retaining for further increase will be indexed and efforts made in 1957 to grow seed stock of them relatively virus-free. Chipping tests will also be run on all white varieties during the winter. To subject them to the most severe chipping test they are allowed to cool to 40°F. and then warmed up to 60°F. for 6 weeks. Nearly all white varieties chip fairly well when freshly harvested, but a good chipping potato will chip well after being subjected to cold temperatures and then cured out at high temperatures.

The varieties were planted, rogued, harvested, tested, and stored as 3 separate groups. Those tested in 1954 or before, one group; those tested for the first time in 1955, the second group; and those tested for the first time in 1956, the third group.

Abbreviations used in listing the varieties are: C.S., Colorado Seedling; B, Beltsville; A, Aberdeen; IA, Iowa; R, Red; W, White.

Older varieties tested and saved in 1956

C. S. 11,012 An early medium-red with a netted skin. Medium type bushy vine. This variety might do very well in the Gilcrest area. If planted in April it will probably mature by August 1 or before. It is a good yielding, good cooking variety, but it has a tendency to set heavy. However, if planted farther apart in the row, fewer smaller tubers develop and a yield of 300 sacks per acre should be expected. This variety was released for increase on private farms in 1956, so there are several hundred sacks in the State.

- C.S. 11,889 An early round white, somewhat flat, with a heavy netted skin. This variety has shown very good cooking quality. It chips well when first dug and bakes especially well. This variety, probably as early as Cobbler, could possibly be a good chipping potato for the Gilcrest area as a source of chipping potatoes during the summer and early fall. It is susceptible to leaf-roll and dry rot, but would probably yield well as a summer crop. About 20 sacks are on hand at Fort Collins, in addition to a small seed source at Steamboat Springs and in the San Luis Valley, so it would be well to plant the 20 sacks at Gilcrest.
- C.S. 11,918 A high-yielding round, white of good to excellent cooking quality. This variety is late maturing. It is a smooth, round high-quality potato, will probably yield as well as Katahdin, and does not sunburn nearly so badly. It has not always chipped well after cold storage. If stored in a warm storage it would probably chip well. It is easy to grow and does not have any particular weaknesses.
- C.S. 12,240 This is the best all-around white potato to be tested in the last 5 years. It is a smooth, round somewhat flattened potato with a creamy type russeted skin. It bakes exceptionally well, and in the small sample chipping tests, it chipped well both before and after cold storage. This variety should probably be increased as a commercial variety and named due to its baking quality alone. It has no apparent serious weakness with the exception of its susceptibility to spindle tuber, and this would not be a serious problem in commercial production once foundation seed was established. This was released for increase on private farms in 1956 so there are several hundred sacks in the State.
- C.S. 13,153 A smooth round white of good quality and yield. It should be tested further, but will probably set too heavy and produce too many small tubers. It has chipped only fair in the past and bakes good. In comparison with 12,240 or 11,918 it would be second rate unless it shows more in the future than it has so far.
- C.S. 13,178 A very good smooth, round white of good size and yield. This variety is earlier and will probably yield as well as 11,918. It will no doubt yield as well as Katahdin and sets deeper so does not sunburn so badly. It has chipped and baked well. If kept in warm storage it would probably chip very well. It is easy to grow under under most conditions and has no serious weaknesses. It should be increased rapidly and tested in the Gilcrest area.
- C.S. 13,222 This variety sets too heavy and produces too many small tubers, yet it has the ability to produce high yields. It did not appear in the test until a year after varieties 12,240 and 11,918, yet it is ready for private increase and produced several hundred sacks in 1956. Possibly planting farther apart in the row would correct the large number of small tubers. In 1954 this variety made the best chips of any in the trials. This has not been a consistent feature of the variety. The specific gravity is always high and the baking quality is very good. It has a tendency to be flat but has a good tough skin and is medium in maturity.

C.S. 13,240 This nice-appearing variety showed promise the first year or two, but in 1955 it began to show a great deal of internal discoloration. This was worse in 1956 and the specific gravity was low, so it was discarded at digging time.

The above 8 lots are still being retained and have been tested for 3 years or more. They have all shown some promise. Some of them will have to be discarded, and no doubt 1957 will see the end of 2 or more. Four that should receive the greatest attention during the next year or two are: 12,240 which is the most promising. It should be indexed and grown under isolation to develop a source of foundation seed as rapidly as possible. Next is 11,012, the early red. This one has a much more limited field. If it doesn't do well in the Gilcrest area, it will not be worth keeping, so it should be indexed for foundation on a less intense scale but tested intensively in Gilcrest. The third is 13,178. It has shown enough promise as a baker and chipper to be increased rapidly as foundation seed. It would probably do well in either the late or early district of Weld County, and on a limited scale it has produced well in the San Luis Valley. The fourth is 11,889. Like 11,012, this variety will have a limited value. Unless it will grow well and mature early in the Gilcrest area it will have little value in the State, since it does not keep well in ordinary storage.

The other four in this older group should be tested further and given a chance to perform, but unless they show outstanding merit within the next year they should be discarded.

Varieties tested for the first time in
1955 and saved in 1956.

- C.S. 13,922 A round white of fair quality, this variety was kept for further testing. The 1955 chip test was good. It is not particularly outstanding otherwise.
- C.S. 13,925 This is an exceptionally high-yielding good-quality potato. It is smooth and has a good tough skin. The specific gravity is good, and the 1955 chip test was good.
- C.S. 13,928 This without doubt is the best variety in this group. It has a heavy russeted skin of good appearance, the specific gravity is good, the yield is high, the chip test in 1955 was fair to good, and the baking quality was excellent.
- C.S. 13,947 A variety of good appearance and type. It has not chipped well and will probably be discarded unless it improves in that respect. It has a smooth white skin.
- C.S. 13,950 A good chipping variety, with fair quality and appearance. Unless it proves outstanding as a chipper it will be discarded. It yields well.
- C.S. 14,038 A good yielding round white. It was kept for further testing. The 1955 chipping test was poor and if this characteristic remains the variety will be discarded.

- C.S. 14,585 This variety is only fair but since it is a red and of fair quality and color it was kept for further testing.
- B 2368-4 A heavy-yielding rough red. It was saved at harvest time only so it could be examined later on. It will probably have no value in Colorado due to its rough shape. If someone wanted to plant it at Gilcrest it might possibly be of value.
- Plymouth A high-yielding rough round white. It was also saved only so it could be examined at sorting time. It shows very little promise for Colorado due to its poor type and quality.
- Merrimack Very poor in nearly all respects. The yield was good but the type, appearance, general quality and specific gravity were poor.
- A-131-20 A very poor quality potato; practically worthless.
- Saco A good-yielding potato but of very poor type and quality. It was discarded at digging time. The chipping test in 1955 was poor.
- Pungo Entirely too big and rough. It yielded fairly well but neither chips or bakes well. It was discarded at digging time.
- Delus This variety shows promise of doing well in Colorado. It was rated excellent in the chipping test in 1955. It yields well and is of good type and quality. The specific gravity is good to excellent, and it does well in heavy soils.
- Ia-736 A long white russeted white that will grow well in heavy soils. It does not grow true to type. It has been carried in the plots for 5 years in the hope a good long white could be selected. This year, with the exception of a few pounds kept for breeding purposes, it was discarded at digging time.
- Waseca This variety would be a good one if it had better color. The type and quality are good, but the color is pale and therefore it was discarded at digging time.

Varieties tested for the first time in
1956

1955 was a very bad year for the spread of virus diseases. When the new varieties were examined in November they showed signs of considerable virus content, but since growing conditions were very poor during the season it was thought they might be better than appearances indicated. The quantity of these samples varied from 2 or 3 tubers up to 10 or 12 pounds.

Of the 101 taken to Fort Collins for increase 47 were red varieties. Most of these were of fair to good quality and color. The possibility of producing a good red variety from the group seemed to be excellent. However, when the plants emerged, it readily became apparent most of them were infected with either spindle tuber or leafroll. Only one red variety was saved from this group. It was C.S. 15,611 and is of good quality and type, as well as color. About a bushel was harvested from the 6 or 8 pounds planted.

Of these 101 varieties 54 were white. They were not particularly outstanding when harvested in 1955, but since the season had been very unfavorable they were planted regardless. They, too, were largely infected with diseases. Forty-four of the 54 were rogued out early while the plants were still small. Of the other 10, only 3 were kept at harvest time: 14,813, 15,001, and 15,002. All had good skin and appearance and high specific gravity.

Scab Resistance Test of Seedling Selections on the
Falk Farm, Del Norte, Colorado, 1956

All of the 101 selections from the 5-hill lots from the Greeley Station, were also grown in 10-hill lots on a farm located on the Falk Brothers farm located in a very scabby area on the upper or west end of the San Luis Valley. Growing conditions in this area are somewhat different from those in other sections of this chief potato growing area of the state. Scab resistance readings were obtained but little information relative to horticulturally desirable characters since much of the material was virus infected. One outstanding number CS 14976 was highly scab resistant and produced a good type and yield of tubers. This same selection was found to be good at Ft. Collins, but there the specific gravity was quite low. An early freeze on August 27th, killed tops and further prevented reliable readings on this plot.

INTER-REGIONAL POTATO INTRODUCTION PROJECT
(Cooperative Project of the 48 States and
the Plant Introduction Section ARS)
R. W. Hougas and R. W. Ross

Solanum stocks (121) were introduced in 1956 from 8 foreign countries: Bolivia, Columbia, Costa Rica, England, Guatemala, Mexico, Netherlands, Peru. Most of these accessions were received following requests for individual stocks directed to foreign research centers. This is in accordance with the general policy of requesting, when possible, stocks known to possess characters of potential value in improvement of the American potato.

1956 was a favorable year for increase of Solanum stocks at the Potato Introduction Station. Good tuber increase was obtained in both the field and greenhouse. Seed increase in the greenhouse was particularly successful. Improved pollination methods, previously described, allowed for an accelerated program of true-seed increase.

Herbarium specimens were prepared in duplicate of all new introductions grown in the 1956 field. One set of pressed mounts was placed in the Introduction Station herbarium for ready working reference. The other set will be made available for taxonomic study.

Fourteen selections of the tetraploid species of S. andigenum and 29 S. andigenum - S. tuberosum hybrids possessing field or "minor gene" resistance to late blight were recently received from Colombia. These selections are of particular interest since (1) S. andigenum hybridizes readily with the commercial potato and (2) "minor gene" resistance appears to be more stable than the "major gene" resistance. Nineteen late-blight-resistant introductions of the cultivated diploid species S. rybinii were also received from Colombia. A portion of the increase from these new introductions will be tested in Mexican field trials.

Six introductions of S. rybinii reported as virus resistant were received from Colombia. Since tetraploids of S. rybinii hybridize rather easily with S. tuberosum these selections are of considerable interest.

Seeds of two species, S. anomalocalyx and S. vallegrandense, with reported resistance to drought were introduced from Bolivia. Neither of these two species were previously represented in the Collection.

The major objective of the Potato Introduction Program is to promote and facilitate the improvement of the commercial potato in the United States by providing a readily available reservoir of useful breeding stocks. Breeders are constantly on the alert for new sources of superior germ-plasm and are conducting incessant researches to incorporate desirable new genes in adapted commercial varieties. The job of hybridization, backcrossing, screening, testing and increasing requires considerable time. Consequently, there is an interim of several years between the recognition of superior germ-plasm and the release of commercial varieties possessing the desirable new genes. Accomplishment of the major objective of this program must be measured largely by the success with which new, improved varieties meet the needs of commercial production.

Three new varieties, Onaway, Tawa and Redbake, were released for commercial production in 1956 by U. S. potato breeders. Onaway has 4 foreign introductions in its pedigree, the Polish variety Busola, the English variety Sutton's Flourball, an Austrian variety Petronius, and a late-blight-resistant W race selection from Germany.

All Onaway's parents, plus the scab-resistant German variety Richter's Jubel and the Chilean variety Villarela, which contributed immunity to potato X-virus, make up the parentage of Tawa.

Redbake has 3 of the 4 parents used to develop Onaway in its parentage, the exception being late-blight-resistant W race.

In July 1956, the United States Department of Agriculture, acting upon a long-standing recommendation of technical workers engaged in potato improvement, initiated a project designed to provide for an orderly evaluation of the tuber-bearing Solanum species. This project is cooperative between the Horticultural Crops Research Branch of USDA and the Wisconsin Agricultural Experiment Station. Work of the project will be conducted at Beltsville, Md., at Madison, Wis., and during the summer growing season at Sturgeon Bay, Wis. The researches of this project are designed to bridge the gap between the work program of the Inter-Regional Potato Introduction Project and the work programs of the several State and Federal investigators, particularly the potato breeders, engaged in potato improvement. The principal areas of investigation in this new project will be cytogenetics and pathology. Researches in both areas have been planned and will be directed to provide fundamental information desired by potato investigators of the nation, concerning Solanum introductions. This will include (1) the reaction of the introduced Solanums to the economically important diseases of the commercial potato, (2) the chromosome number and general breeding behavior of the introduced stocks, and (3) the crossability of the Solanum introductions with the cultivated potato, S. tuberosum.

Initial shipments of Solanum stocks from the IR-1 collection are presently being studied by personnel of this newly-established project.

NORTH CENTRAL REGIONAL TRIALS 1956
August E. Kehr and Cooperators 1/

This year marks the completion of the sixth season for these trials. In 1956 Ohio joined our group to actively participate, making a total of 9 States in which the trials were conducted. These trials are customarily the final testing on the most advanced selections and often the decision for naming selections as a released variety is based upon these tests. Thus of the 10 selections included in last year's tests 3 have been named and released as follows:

<u>Progeny No.</u>	<u>Release name</u>	<u>Introduced by</u>
I 803-3	Tawa ✓	Iowa, Mich, USDA
Wis. D 27.50	Antigo ✓	Wis.
Migh. 1363	Onaway ✓	Mich.

Environmental Conditions: The tests were conducted on peat soils in Indiana and Iowa, and on mineral soils in the other 7 States. Fertilizer applications and space between the hills and between the rows are based upon local conditions and soil requirements.

The earliest planting date was March 23 in Missouri.

Weather conditions were highly variable. In general, the season was cool and favorable to good crops. Indiana, Michigan, and Ohio had higher than normal rainfall early in the season, and stands were affected adversely in Indiana and Ohio. In North Dakota the favorable climatic conditions led to the production of an exceptionally good crop of unusually high quality.

Yields: In the early group Neb. 26.44-1 (Redbake) gave the highest average yields in all nine locations, slightly out-yielding Triumph. In the late group no selection yielded higher than the Red Pontiac check. However, it should be emphasized that the environmental conditions from one location to another varied greatly and conclusions drawn from average figures may be erroneous. The data from Indiana are not included because the stand was so badly affected by the spring flooding.

Maturity: The earliest maturing varieties on the average were I 911-2 and N.D. 2906-1R. These two selections were earlier than Triumph or Cobbler.

Percentage Solids: There was no marked variability among varieties in total solids, the range being only 16.8% to 19.7%, or a difference of 2.9%. However, in location, the range was 16.5% to 21.0%, or a difference of 4.5%. It therefore appears that location has a much greater effect on solids than variety. This had been found to be true in past years in these trials.

Among the varieties with the highest solids were Wis. 0112.51, Neb. 26.44-1 and Minn. 13, all of which were higher than Irish Cobbler.

1/ Indiana H. T. Erickson; Michigan, N. R. Thompson; Minnesota, F. A. Krantz; Missouri, V. N. Lambeth; Nebraska, H. O. Werner; North Dakota, R. H. Johansen; Ohio, W. N. Brown; Wisconsin, G. H. Rieman.

Scab Resistance: Among the more scab-resistant lines were Wis. 0103.51, BE 2335-42, I 911-2, and N.D. 2906-1R. Of these only Wis. 0103.51 had scab of no worse than 2 type pustule in any single trial in the 9 States.

Overall Merit Ratings: The entries were ranked as follows by the 9 State evaluations:

	<u>Points</u>
1. N.D. 2906-1R	17
2. Neb. 26.44-1 (Redbake)	16
3. Wis. 0103.51	14
4. Wis. 0112.51	14
5. Red Beauty	13
6. Red Pontiac	10
7. N.D. 457-1-10	8
8. Minn. 13	6
9. BE 2335-42	5
10. N.D. 457-1-16	5
11. I 961-1	4
12. I 911-2	4

Outstanding Parents: At the meeting of the cooperation in Cincinnati in December 1956, it was agreed to present a list of outstanding parents used in the various breeding programs. There are parents which have been proved or which are currently being used extensively. The following is a summary of these parents as submitted by Iowa, Minnesota, Nebraska, North Dakota, Wisconsin, and Michigan.

Submitted by Iowa (August E. Kehr):

B 595-76 = White, early. Parents 41956 x Cherokee. Resistant to scab, resistant to late blight (races 0, 24), X immune, resistant to verticillium wilt, very high specific gravity, low in pollen fertility, but an excellent female. Gives nice smooth whites.

I 801-10 = White, medium. Parents B 595-76 x B 67-11. Highly scab-resistant, late-blight-resistant, X-immune, specific gravity higher than Cobbler, excellent yields, low in pollen fertility, but an excellent female. Valuable for source of X immunity.

I 1077-2 28-5 = White, medium late. Parents Minn. 113.43-1 x GQT-1. Scab resistant, immune to late blight races 0, 14, 12. Pollen fertile, fair as female, solids equal to Cobbler, one of the best sources of high-yielding ability.

B 922-3 = White, early. Parents T1-5 x B 355-24. Resistant to late blight races 0, 14, resistant to virus Y, gives vigor in seedling progenies, seems to carry minor gene late blight resistance, pollen fertile.

La. 1859 = Pink, medium late. Parents Pontiac x (X 95-56). Very highly scab resistant, resistant to late blight races 0, 12, 14, and seems to carry minor genes for late blight resistance. Very high yields, specific gravity equal to Cobbler, pollen fertile.

Submitted by Minnesota (Florian Lauer):

Parent Clone and Outstanding Characteristics

69.49-4-51 - High scab resistance, early, and pollen fertile.
55.50-26-52 - High scab resistance, excellent tuber and vine type.
71.48-4-50 - High scab resistance, early and excellent vine type
50.49-7-51 - High scab resistance, and pollen fertile.
M 355 - Early, good vine type, field resistant to late blight, R1 immunity gene for late blight.
56-1 - Extra early, broad leaves, erect stems, low tuber set and pollen fertile.
Osseo - Extra early, broad leaves, erect stem and low tuber set.

Submitted by Nebraska (H. O. Werner):

Lines of known parental value:

59.41-P1 - Scab resistance, light red color, good interior, satisfactory dry matter, good yield, fertile pollen. Lacks good tuber type. Has been used in many Nebraska crosses for scab resistance in red tubers.

223.48-1x - Very good type, mid-season, round elliptical, scaly russet, very high scab resistance, fair interior quality, medium specific gravity, fair to good cooking quality, good yields, very versatile adaptability. Good pollen. Produced high percentage of segregates of very good tuber type and good scab resistance, but fair to poor interior color.

Scab-resistant red lines being used extensively although parental value is only partially known:

114.51-2 - Early bright medium red tubers of very good type and intermediate to high dry matter, very high scab resistance, good pollen, but only intermediate interior color.

156.52-2 - Mid-season, medium to dark red, good type, intermediate interior color, medium dry matter, good pollen.

45.51-4 - (186.47-3x 60.47-15x) - Medium early, medium to light red, very good type, high dry matter, fair interior, good pollen.

Very good type red lines that are known to produce progenies with many good type red tubers, some with very good interior and high dry matter content, but scab susceptible;

93.48-1 - Very good type, dark red, high dry matter, fair cooking quality, moderate heat resistance, good pollen, but scab susceptible and only fair interior.

82.49-1x - Medium late, good type, bright light red tubers with very white interior color, very high yield, very good cooking quality, but no pollen, anthers being defective. Not as susceptible to scab as many lines. Stocks have remained free of virus X.

72.49-1 - Dark red, very good type, high dry matter, good pollen, poor interior color and no scab resistance.

215.50-2 - Intermediate season, light red, very good type, shallow-eyed long, elliptical tubers of very high dry matter, good heat endurance and abundant good pollen.

Submitted by North Dakota (R. H. Johansen):

Selection	Parentage	Skin color	Maturity	Disease resistance	Other characteristics
ND 457-1	Sebago x 92.36-5	White	Med. late	Virus Y	Smooth tuber type
ND 457-1-10	(457-1 self)	"	Early	"	Type
ND 457-1-16	(457-1 self)	"	"	"	"
ND 2853-3R	Cayuga x 1021-1	Red	Late	None	Red color, type yield
ND 2906-1R	626 x Redkote	"	Early	Scab	Red color, type yield
ND 2910-1R	766-9 x 922	"	Late	"	Red color, type yield

Submitted by Wisconsin (G. H. Rieman):

Wis. X137.52 Parents-B595-76 x Minn. 113.43-1-45

Phenotypic description. Light russet, medium early, free from internal necrosis, medium to high specific gravity, scab resistant (1-2), X virus immune, resistant to blight race O, male and female fertile, profuse flowering in field and greenhouse.

Combining ability. High transmission of resistance to scab, desirable tuber shape, medium to early maturity and fertility; low transmission of immunity to virus X.

Wis. X143.52 Parents-B 595-76 x Minn. 113.43-1-45

Phenotypic description. Light russet, medium maturity, free from internal necrosis, high specific gravity, scab resistant (2-2), X virus immune, resistant to blight race O, male and female fertile, profuse flowering in field and greenhouse, resistance to virus Y, field resistance to verticillium wilt.

Combining ability. High transmission of resistance to scab, desirable tuber shape, medium maturity and fertility. Low transmission of immunity to virus X. The combining ability for freedom from internal necrosis, high specific gravity, and resistance to late blight race O, virus Y and verticillium wilt is unknown.

Submitted by Michigan (N. R. Thompson):

B 595-76 (41956 x Cherokee) - White, medium maturity immune to viruses X and A. Resistant to scab, late blight and verticillium wilt. High specific gravity. Pollen sterile.

Ia 902-3 (B 595-76 x Minn. 113.43-45) - White, medium maturity. Immune from virus X, resistant to scab and late blight. High specific gravity. Fertile.

Ia 1107-4 (B 595-76 x Osage) - White, medium maturity. Immune from virus X, resistant to scab and late blight. High specific gravity. Fertile.

Ia 1077 W 28-5 (Minn. 113.43-1 x GQT-1) - White, late. Resistant to scab and late blight. Fertile.

Ia 1114-2 (B 776-2 x B 962-32) - Russet, late. Immune from virus X, resistant to scab and late blight. Fertile.

North Central table 1.

Indiana. COOPERATORS - N. K. Ellis and H. T. Erickson. LOCATION - Walkerton, Ind. SOIL TYPE - Muck. FERTILIZER - 1120#/A 5-20-20. SPACING - Hills 12", rows 36", DATE PLANTED - May 7, 1956. DATE HARVESTED - September 26, 1956.

REMARKS - Rainfall for the growing season: May - September, inclusive, 13.28 inches. Nearly half occurred in May and resulted in severely reduced stand in certain entries as a result of tuber rot. Temperature was below normal most of the season. The year was generally cool and dry. No irrigation water was applied. DDT + 2 ineb 78; Zinc copper + dieldrin; Cu Sulfate + lime + DDT; and Cu Sulfate + lime + Heptaclor sprays were applied. Virtually no insect or disease damage. Heavy frost on September 20 effectively killed the vines. They were mowed the 24th.

Nebraska. COOPERATOR - H. O. Werner. LOCATION - Alliance, Nebr. SOIL TYPE - Sandy loam. FERTILIZER - Alfalfa plowed under. SPACING - Hills 12", rows 36". DATE PLANTED - June 30, 1956. DATE HARVESTED - October 3, 1956.

REMARKS - Several applications of DDT applied. Vines still green at harvesttime.

Iowa. COOPERATOR - A. E. Kehr. LOCATION - Clear Lake, Iowa. SOIL TYPE - Peat. FERTILIZER 1200#/A 0-9-27. SPACING - Hills 12", rows 36". DATE PLANTED - April 26, 1956. DATE HARVESTED - August 28, 1956.

REMARKS - Rainfall was adequate during July, August and September. Ideal growing conditions for this period. June was hot and dry. DDT and Dithane applied every 5 - 7 days starting in early June. Grasshoppers very bad throughout the season. Vines killed with Sodium Arsenite September 6, 1956.

Michigan. COOPERATOR - N. R. Thompson. LOCATION - Lake City, Mich. SOIL TYPE - Iosco. FERTILIZER - 500#/A 5-20-20. SPACING - Hills 11", rows 36". DATE PLANTED - May 14, 1956. DATE HARVESTED - October 3, 1956.

REMARKS - Good conditions for potatoes prevailed throughout most of the growing season. A total of 15.39 inches of rainfall was well distributed. Potatoes were irrigated twice, once in June and once in July. Late September was quite dry. Dithane plus DDT was applied at weekly intervals until August

15, then Copper + DDT. The vines were killed by rotobating on September 17.

Minnesota. COOPERATOR - F. A. Krantz. LOCATION - Duluth, Minn. SOIL TYPE - Heavy clay. FERTILIZER - none. SPACING - Hills 18", rows 42". DATE PLANTED - May 20, 1956. DATE HARVESTED - September 20, 1956.

REMARKS - Rainfall and temperature were normal. Severe infestation of late blight occurred in the middle of August.

Ohio. COOPERATORS - W. N. Brown and John Bushnell. LOCATION - Wooster, Ohio. SOIL TYPE - Wooster silt loam. FERTILIZER - 1500#/A 5-10-10. SPACING - Hills 11", rows 36". DATE PLANTED - May 22, 1956. DATE HARVESTED - September 22, 1956.

REMARKS - Humidity above normal. Ground was too wet to cultivate at anytime before September 10. Four applications of Dieldrin, DDT, with Dithane were applied. Weeds were allowed to grow until pulled by hand August 13. The weeds appeared to be beneficial.

Missouri. COOPERATOR - V. N. Lambeth. LOCATION - Franklin, Missouri. SOIL TYPE - Menfro Silt Loam. FERTILIZER - Plowed down 20-90-120, Banded 200#/A 12-12-12, side dressed 40# N after tuber set. SPACING - Hills 12", rows 40". DATE PLANTED - March 23, 1956. DATE HARVESTED - July 25, 1956.

REMARKS - The temperature was generally favorable except for a 2 week period early in June and the latter part of July. Rainfall was deficient in May and late June. One and a half inches of irrigation was applied in early May and the middle of June, two inches was applied the first week of July. Malthion was applied soon after emergence for potato aphids. Sprayed at 10-14 day intervals through May and first part of June with Methoxychlor-Zineb. Early blight had caused some defoliation by harvesttime. The vines were cut off 4 days prior to harvest. Wisconsin lines were dormant at planting time - late in emerging the soil remained exceptionally porous. Yields were about 50% above average. Frost occurred September 21.

North Dakota. COOPERATOR - R. H. Johansen. LOCATION - Grand Forks, N. Dak. SOIL TYPE - Bearden Clay loam. FERTILIZER - 200#/A 12-12-6. SPACING - Hills 12", rows 38". DATE PLANTED - May 22, 1956. DATE HARVESTED - September 21, 1956.

REMARKS - Rainfall was adequate and temperatures were cool during the growing season. Plots were dusted regularly with DDT and Toxaphene with later applications of Dithane. Vines were killed by rotobating on September 4. Fertilizer was applied in band form at planting time.

Wisconsin. COOPERATOR - G. H. Rieman. LOCATION - Rhinelander, Wis. SOIL TYPE - Sandy loam. FERTILIZER - 600#/A 5-20-20. SPACING - Hills 18", rows 36". DATE PLANTED - May, 1956. DATE HARVESTED - September, 1956.

REMARKS - Cool temperatures and adequate rainfall prevailed. Parzate was used on a 7 day schedule. Parzate plus DDT was used on a 21 day schedule. Yields were a little below average for the region due to very light sandy soil. The vines were killed by frost one week before harvest. Only a trace of scab developed in the entire plot which was selected for the free-com from this causal organism.

North Central table 2.--Yields of U. S. No. 1 and percent of total yields which were U. S. No. 1 size. 1/

Variety	Iowa	Mich.	Minn.	Mo.	Neb.	N. D.	Ohio	Wis.	Average									
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.								
EARLY																		
I 911-2	343	98	542	95	210	-	353	84	272	79	154	77	271	77	291	94	304	86
I 961-1	288	96	571	95	305	-	388	89	317	83	303	94	354	89	327	93	357	91
N.D. 457-1-10	406	97	561	96	336	-	512	95	305	77	300	97	342	91	396	94	395	92
N.D. 457-1-16	383	97	587	96	330	-	492	94	192	41	317	95	359	88	327	90	373	86
N.D. 2906-1R	451	95	601	95	295	-	494	92	150	31	314	94	410	87	422	95	392	84
Neb. 26.44-1	410	96	567	93	407	-	351	76	371	81	370	94	-	-	475	98	422	90
Red Beauty	246	95	572	94	182	-	307	78	-	-	221	88	381	86	403	95	330	89
Triumph	363	94	672	94	344	-	462	91	254	51	328	93	-	-	443	94	409	86
Cobbler	634	97	564	90	234	-	493	91	45	11	285	90	334	85	308	87	362	79
LSD .05	137.9		85.3		78.4		47.7		---		56.2		116.3		51.3			
.01	186.9		115.5		106.3		64.7		---		76.2		159.5		69.6			
LATE																		
FE 2335-42	141	69	513	91	326	-	78	64	191	59	336	94	188	70	380	86	269	76
Minn. 13	589	97	545	93	368	-	392	94	226	57	298	97	331	93	371	91	390	89
Wis. 0103.51	392	97	576	93	386	-	346	93	295	79	335	96	367	88	475	96	396	92
Wis. 0112.51	411	96	515	90	240	-	301	81	362	86	256	91	348	85	322	89	344	88
Red Pontiac	718	97	833	96	423	-	490	91	264	60	435	97	562	93	598	96	540	90
LSD .05	212.8		113.5		52.9		36.1		---		50.2		152.1		54.3			
.01	298.3		159.3		74.1		50.6		---		70.4		213.2		76.2			

1/ Indiana data omitted because of poor stand.

North Central table 3.--Maturity classification.

Early	Iowa	Mich.	Minn.	Mo.	Neb.	N.D.	Ohio	Wis.	Ave.
I 911-2	2.5	2.3	1.0	2.0	2.0	1.0	1.0	1.4	1.6
I 961-1	3.5	3.0	3.0	3.0	2.0	2.5	2.0	2.1	2.6
ND 457-1-10	3.0	2.3	2.0	2.0	3.0	2.5	1.0	2.1	2.2
ND 457-1-16	3.3	2.3	2.0	2.5	4.0	2.5	1.0	2.1	2.5
ND 2906-1R	2.7	2.5	1.0	2.0	3.0	2.0	1.0	1.8	2.0
Neb. 26.44-1	3.7	2.3	4.0	4.0	3.0	2.5	-	2.6	3.1
Red Beauty	3.7	3.5	1.0	3.0	-	2.0	3.0	2.5	2.7
Triumph	3.0	2.0	3.0	2.0	2.0	2.0	-	2.1	2.3
Cobbler	3.2	2.5	3.0	2.5	3.0	2.0	2.0	1.6	2.5
Late									
BE 2335-42	4.0	4.0	5.0	5.0	3.0	5.0	3.0	4.2	4.1
Minn. 13	3.7	3.5	5.0	5.0	3.0	3.0	2.0	2.6	3.5
Wis. 0103.51	3.5	3.5	4.0	4.0	4.0	5.0	3.0	3.8	3.8
Wis. 0112.51	3.7	2.8	1.0	3.0	3.0	3.0	2.0	2.4	2.6
Red Pontiac	4.0	3.5	5.0	4.0	4.0	3.0	3.0	3.0	3.7

- 1 = Very early
2 = Early
3 = Medium
4 = Late
5 = Very late

North Central table 4.--Total solids.

Variety	Ind.	Iowa	Mich.	Minn.	Mo.	Neb.	N.D.	Ohio	Wis.	Ave.
EARLY	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
I 911-2	16.2	16.5	16.9	18.6	17.7	20.5	21.6	18.0	18.8	18.3
I 961-1	16.7	16.7	16.7	18.6	16.2	19.4	20.7	17.5	17.3	17.7
ND 457-1-10	15.0	16.0	16.2	17.5	16.5	20.1	20.7	16.9	18.6	17.5
ND 457-1-16	14.3	16.0	16.5	18.6	16.5	20.5	21.2	17.3	18.4	17.7
ND 2906-1R	15.4	15.0	15.4	17.7	14.8	19.0	20.1	16.2	17.5	16.8
Neb. 26.44-1	18.4	17.1	18.6	19.4	16.7	21.8	22.0	-	20.3	19.3
Red Beauty	17.1	16.5	16.0	19.0	16.5	-	20.3	18.2	19.2	17.8
Triumph	15.4	15.4	16.5	17.5	15.2	19.4	20.5	-	18.4	17.3
Cobbler	16.7	17.3	17.1	18.0	17.3	20.5	21.8	18.2	19.2	18.4
LATE										
BE 2335-42	17.5	17.3	17.5	18.8	16.0	20.5	20.7	18.4	18.4	18.3
Minn. 13	16.9	17.5	18.0	19.9	18.2	21.6	22.4	18.2	20.1	19.2
Wis. 0103.51	15.6	15.8	16.5	17.3	15.8	19.0	19.4	18.0	18.2	17.3
Wis. 0112.51	20.1	19.9	17.7	20.5	18.4	20.7	21.8	18.6	19.9	19.7
Red Pontiac	16.9	15.6	16.2	19.2	15.0	18.2	20.7	16.9	18.2	17.4
Average for location	16.6	16.6	16.8	18.6	16.5	20.1	21.0	17.7	18.7	

North Central table 5.--Scab reactions reported.^{1/}

Variety	Ind.		Iowa		Mich.		Minn.		Mo.		Neb.		N.D.		Ohio		Wis.	
	Area	Type	Area	Type	Area	Type	Area	Type	Area	Type	Area	Type	Area	Type	Area	Type	Area	Type
I 911-2	2	1	2	2	0	0	2	5	T	3	1	1	T	1	0	0	0	0
I 961-1	1	3	T	3	0	0	3	5	1	3	1	3	1	2	0	0	0	0
ND 457-1-10	3	3	1	3	0	0	3	5	1	3	2	3	2	2	T	1	0	0
ND 457-1-16	3	3	1	4	1	4	5	5	1	3	4	3	2	3	0	0	0	0
ND 2906-1R	3	2	3	2	0	0	3	5	0	0	3	4	1	1	0	0	0	0
Neb. 26.44-1	1	3	1	3	0	0	5	5	T	1	1	2	2	3	0	0	0	0
Triumph	3	3	2	4	2	3	5	5	1	3	2	3	3	4	0	0	0	0
Cobbler	3	3	1	4	0	0	5	5	1	3	3	4	2	4	1	4	0	0
BE 2335-42	3	1	3	2	0	0	2	4	T	3	2	1	3	3	T	1	0	0
Minn. 13	3	3	1	4	0	0	4	5	2	3	1	2	3	4	1	5	0	0
Wis. 0103.51	3	2	3	2	0	0	3	2	0	0	1	1	3	2	0	0	0	0
Wis. 0112.51	2	1	T	4	0	0	5	5	T	3	1	1	2	3	T	1	0	0
Red Pontiac	2	2	1	4	0	0	5	5	1	3	2	2	3	3	T	1	0	0

^{1/} Area:

T = less than 1%

1 = 1 - 20%

2 = 21 - 40%

3 = 41 - 60%

4 = 61 - 80%

5 = 81 - 100%

Type of pustule:

1 = Small, superficial

2 = Larger, still superficial

3 = Large, rough pustules

4 = Large pustule, shallow holes

5 = Large pustule, deep holes

North Central table 6.--Average external defects

Variety	Scab	Growth cracks	Second growth	Sun green
	Pct.	Pct.	Pct.	Pct.
<u>EARLY</u>				
I 911-2	9.3	0.6	2.2	2.1
I 961-1	27.9	0.2	1.4	4.7
ND 457-1-10	30.6	4.1	1.2	3.6
ND 457-1-16	38.1	3.4	2.5	5.2
ND 2906-1R	32.6	1.0	0.5	1.9
Neb. 26.44-1	37.8	0.4	0.1	2.6
Red Beauty	45.3	0.4	0.0	2.8
Triumph	38.1	9.3	3.6	0.7
Cobbler	45.5	0.1	5.0	2.2
<u>LATE</u>				
BE 2335-42	33.2	0.4	2.5	2.1
Minn. 13	51.7	2.0	0.7	8.4
Wis. 0103.51	34.1	2.2	0.1	7.5
Wis. 0112.51	32.5	0.0	1.4	2.2
Red Pontiac	43.6	1.2	2.9	2.2

North Central table 7.--Percent internal defects.

Variety	Hollow heart	Internal necrosis	Vascular discoloration	Normal tubers
	Pct.	Pct.	Pct.	Pct.
<u>EARLY</u>				
I 911-2	0.4	1.0	4.0	94.7
I 961-1	0.2	1.1	11.2	87.5
ND 457-1-10	2.9	4.7	31.9	62.4
ND 457-1-16	2.4	3.4	37.1	59.2
ND 2906-1R	1.2	2.0	4.0	93.4
Neb. 26.44-1	1.3	0.1	14.3	84.3
Red Beauty	0.2	2.0	9.2	88.7
Triumph	0.3	0.0	6.3	93.4
Cobbler	4.2	2.0	24.4	71.5
<u>LATE</u>				
BE 2335-42	5.0	1.9	2.9	90.7
Minn. 13	7.7	0.5	10.5	81.4
Wis. 0103.51	5.6	1.7	5.2	89.0
Wis. 0112.51	3.5	0.5	6.0	90.7
Red Pontiac	2.0	1.0	11.4	85.6

North Central table 8.--Merit ratings.

Variety	Ind.	Iowa	Mich.	Minn.	Mo.	Neb.	N.D.	Wis.	Total Merit Points
I 911-2	5					3			4
I 961-1			5			4	5		4
ND 457-1-10		2		4	4				8
ND 457-1-16			4		3				5
ND 2906-1R		1		5	1		1	5	17
Neb. 26.44-1	4	4		3		1		2	16
Red Beauty			2				2	1	13
Triumph									0
Cobbler					5				1
BE 2335-42	3						4		5
Minn. 13		3						3	6
Wis. 0103.51			1	1	2				14
Wis. 0112.51	1	5	5			2	3		14
Red Pontiac	2			2				4	10

Merit points determined as follows:

Merit ratings

1
2
3
4
5

Merit points

5
4
3
2
1

47
PACIFIC NORTHWEST
John G. McLean

Scab resistance. The distribution of scab on the Aberdeen Experimental Station makes screening for scab resistance relatively easy. Russet Burbank, Early Gem, Ontario, and Menominee showed type 2 or 3 lesions, while slightly resistant or susceptible material was seriously affected with pit scab. In a few fields in the Aberdeen area the Russet Burbank has been seriously affected, resulting in 80 percent unmarketable tubers because of deep pitted scab.

In 1956 the scab test was planted on a field with a history of severe scab on Russet Burbank. Ninety scab-resistant lines and varieties were tested, and a Kennebec control was planted adjacent to each two lines. Infection on Kennebec ranged from an index of 2.8 to 60.0 of type 5 scab. (Index of 100 = 100 percent of the surface of all tubers.) The most resistant lines and the comparable Kennebec controls are listed in McLean table 1.

McLean table 1.--Amount and type of scab on resistant lines and Kennebec controls in 1956.

Name	Parents	Scab index	Type	Skin* type	Kennebec control	
					Index	Type
A119-15	R. Burb. x A102-35	0.2	3	R	8.6	5
A247-1	R. Burb. x B3019-2	.2	3	R	15.6	5
A240-7	R. Burb. x B986-7	.0	0	HR	26.0	5
A5-11	E. Gem self	.0	0	R	42.6	5
A123-7	E. Gem x 245-186	.0	0	R	14.0	5
A5-5	E. Gem self	.0	0	R	20.0	5
A173-12	E. Gem x B2756-6	.0	0	R	60.0	5
A115-21	R. Burb. x 528-170	.2	3	R	60.0	5
A183-52	E. Gem x B986-7	.2	3	R	14.0	5
A119-1	R. Burb. x A102-35	.0	0	R	8.6	5
A170-8	R. Burb. x B986-7	.2	3	MR	45.4	5
A248-21	Sequoia x B986-7	.3	1	S	15.2	5
A223-56	B2102-11 x Ia8186-25	.6	3	Red	26.0	5
A122-1	E. Gem x Hindenburg	.2	2	S	14.0	5
A104-3	Mohawk x Menominee	.4	3	S	14.0	5
A180-26	E. Gem x B2756-2	.6	2	HR	21.0	5
A1-4	Menominee self	.4	3	S	13.4	5
A170-9	R. Burb. x B986-7	.0	0	R	36.4	5
A1-10	Menominee self	.0	0	S	50.4	5
A124-60	E. Gem x Menominee	.0	0	R	60.0	5
A242-1	A101-17 x A1-30	.0	0	HR	25.0	5
A183-5	E. Gem x B986-7	.0	0	HR	40.4	5
A224-9	Ia8186-25 x B56-11	.0	0	Red	40.4	5
A1-19	Menominee self	.0	0	S	50.4	5
Plymouth		17.8	5	S	13.4	5
Antigo		13.0	3	S	40.2	5
Ontario		3.4	2	S	8.8	5
White Rose		29.4	5	S	18.0	5
Menominee		1.2	3	S	8.8	5
Cherokee		42.6	5	S	50.4	5

* R, russet, MR, moderate russet, HR, heavy russet, S, smooth.
No replication; paired comparison with Kennebec.

Considerable variation in the amount of scab throughout the field existed. Where marketable Kennebec tubers were produced, the adjacent lines were not considered in the test. The difference in scab type was believed to be due to varietal resistance.

Only 2 of the smooth-skin lines were completely resistant to scab and 4 others showed resistance comparable to Menominee and Ontario. One red-skin line had no scab; one showed small amount of type 3 scab. Ten of the russet-skin types were resistant, showing no scab, and 6 had type 3 lesions or less. The russet skin is not the primary source of scab resistance, however, since one russet line produced tubers on which 95.2 percent of the skin surface was affected by pit scab.

Early Gem planted adjacent to the scab test produced all scab-free tubers. Early Gem in other scabby fields in the area was not scabbed while Russet Burbank in the same field was 70 to 80 percent unmarketable because of scab.

Leaf roll resistance. In the past few seasons, the test for resistance to leaf roll at Parma, Idaho, has been so severe that no line has survived when replanted for further testing. The replanted B24-58 and B579-3 produced very strong leaf roll symptoms in 1956, while B2759-5 produced 50 percent small, stunted plants which later showed apical symptoms, although the lower leaves were not rolled.

One of 18 lines previously obtained from R. V. Akeley (B3393-3) showed no symptoms when exposed in 1956. In other first-year tests only 4 of 53 lines showed no current-season symptoms: B24-58, B579-3, B2759-5, and A183-11. A183-11, however, produced 80 percent moderate net necrosis at harvesttime. From an additional 482 lines furnished by R. V. Akeley 6 samples showed no current-season leaf roll: B3804-27 and 48; B3807-24, 31 and 33; and B3820-37.

One advanced russet selection, A180-26, showed no net necrosis in the 1956 test.

Verticillium wilt resistance. Verticillium wilt was more severe than usual in eastern Idaho in 1956 because of the early and warm summer. On the Egin bench, near Rexburg, Idaho, many of the fields of Russet Burbank were dead by August 20.

The more resistant and higher-yielding lines in the Verticillium-wilt test at Rexburg are compared to Russet Burbank and Red Beauty in McLean table 2. Some of the late, highly resistant types did not produce many tubers in 1956 because of the continued warm weather in August and September. The negative correlation between Verticillium wilt symptoms and yield was not as striking in 1956 as it has been in previous years. Of the 11 highest-yielding russet types, only A183-8 has been considered for possible release. Both A183-8 and Red Beauty appeared to be too low in total yield to be of commercial value. Some lines which had showed promise at Rexburg produced mostly large, rough tubers in 1956.

McLean table 2.--Verticillium index and yield at Rexburg, Idaho, 1956. (Two replications, 5 hills each).

Line or variety	Skin type	Vertc. index	Total yield	U. S. No. 1 yield
			Sx./A.	Sx./A.
All5-9	Russet	15	394	244
All6-15	"	28	333	204
A205-9	"	T	280	185
A180-30	"	T	214	180
A116-58	"	28	450	160
A246-26	"	17	316	134
A150-53	"	22	426	122
A247-13	"	7	278	122
A183-8	"	2	189	122
A167-3	"	28	254	118
A170-5	"	2	319	116
Russet Burbank	"	57	241	62
Red Beauty	Red	38	192	145
B3199-19	Smooth	1	270	212
41956	"	3	250	192
L. S. D. at 5%		25	78	60

Growth regulator treatment for Verticillium wilt. The 1955 results of tuber treatment with growth substances indicated that naphthylene acetic acid showed some promise in prolonging dormancy and thereby controlling Verticillium wilt. To avoid the necessity of breaking dormancy with ethylene chlorohydrin the methyl ester of naphthylene acetic acid was used in 1956.

The results of mid-March treatment of whole tubers of 4 varieties planted at Rexburg are shown in McLean table 3.. Significant reduction of wilt symptoms were generally found where the concentration of MENA was greater than 100 p.p.m., while an application of 500 p.p.m. as a dip or 1000 p.p.m. as either a spray or dip reduced the yield of all 4 varieties.

The yields of Triumph and Kennebec were unfavorably affected by treatment, while those of Early Gem showed increased total yield and especially an increase in the amount of No. 1 tubers from many of the concentrations. Significant increase of yield and No. 1 tubers was found with only one treatment on Russet Burbank.

The results of treating cut seed of Russet Burbank with methyl ester of naphthylene acetic acid just previous to planting are shown in McLean table 4. The delayed maturity of the plants significantly reduced Verticillium symptoms in all cases. The stand, total yield, and yield of U. S. No. 1 tubers were reduced by dipping at the higher concentrations and by spray at 5000 p.p.m. While the total yield was reduced with all treatments, significant increases in the yield of No. 1 tubers were produced by spraying with 1000 p.p.m. and 100 p.p.m.

McLean table 3.--Verticillium wilt, total yield, and yield of U. S. No. 1 tubers at Rexburg, Idaho, following MENA treatment of whole tubers.

Treatment with MENA p.p.m.	Vertc. index	Yield		Vertc. index	Yield	
		Total	U. S. No. 1		Total	U. S. No. 1
		Lb.	Lb.		Lb.	Lb.
TRIUMPH				EARLY GEM		
DIPPED:						
1000	60**	2.7**	2.1**	17**	2.4	1.6
500	63**	3.8**	2.4**	19**	1.5	0.8
200	65**	4.6**	2.3**	63	5.3*	3.1*
100	67**	5.5	3.6	47**	3.8	2.0
50	72	6.5	4.9	67	6.7*	4.5*
SPRAYED:						
1000	73	4.4**	2.6	50**	4.8	4.1*
500	65**	5.5	5.2	58**	5.0	3.0*
200	68	6.0	4.7	67	4.6	4.0*
100	58**	6.6	5.6	63	6.0*	4.3*
50	77	3.6	2.0**	70	2.9	2.2
Control	80	7.6	4.6	73	2.4	0.7
L.S.D. at 5%	12.7	2.7	2.1	12.7	2.7	2.1
KENNEBEC				RUSSET BURBANK		
DIPPED:						
1000	42**	5.5**	1.2**	48**	5.2	3.6
500	21**	4.1**	0.1**	67	5.7	3.7
200	16**	9.8**	5.8	23**	6.5	4.4
100	19**	13.7	3.3**	17**	5.4	4.7
50	65	9.2**	5.7	33**	6.7	2.3
SPRAYED:						
1000	58	6.0**	4.2**	48**	6.3	4.9
500	47**	8.9**	3.5	32**	6.4	4.7
200	42**	10.4**	7.0	22**	11.0*	9.2
100	28**	5.2**	4.2**	28**	7.1	2.6
50	53	8.8**	5.8	65	6.9	3.7
Control	65	14.8	6.3	70	7.1	3.5
L.S.D. at 5%	12.7	2.7	2.1	12.7	2.7	2.1

* Significant increases

** Significant decreases

Two replications; 5-hill plots.

McLean table 4.--Stand, Verticillium index, and yields at Rexburg, Idaho, following MENA treatment of cut seed of Russet Burbank previous to planting.

Treatment with MENA p.p.m.	Stand No.	Verticillium index	YIELD	
			Total Lb.	U.S.No.1 Lb.
DIPPED:				
5000	1.7**	8.7**	1.9**	0.1**
1000	4.3**	6.0**	3.8**	0.9**
500	4.7**	22.3**	6.5**	3.9
100	6.3	23.0**	11.2	5.5
SPRAYED:				
5000	3.7**	15.3**	3.7**	1.6
1000	7.7	31.7**	10.3	6.3*
500	7.0	36.0**	8.8	2.8
100	9.7	40.6**	11.2	6.1*
Control	10.0	70.6	12.8	3.3
L.S.D. at 5%	4.1	24.9	5.7	2.4

* Significant increases

** Significant decreases

Average of 3 replications; 10 hills each

Trials identical to those reported in McLean tables 3 and 4 were also conducted at Aberdeen, Idaho, where Verticillium wilt was not as serious. No increases in yield were realized by any of the treatments at Aberdeen.

SOUTHERN PROJECT
(Louisiana Headquarters)
T. P. Dykstra

The year 1956 was a fairly good year for potato production in the South. A total of 41 advanced seedlings were selected from the increase plots in Crossville, Tenn., on the basis of disease resistance and desirable appearance. These were tested for adaptability under Louisiana growing conditions by planting them in a preliminary yield plot in 3 different locations in the State. Twenty-five hills of each seedling were planted in a row 3 feet apart, covering an area of 1/6000 of an acre. The yield in pounds of this area multiplied by 10 corresponds to yields in bushels per acre. One of the yield tests was planted in the spring at Port Sulphur in the extreme southern part of Louisiana. Due to absence of frost and to the presence of other favorable growing conditions, excessive high yields for Louisiana were obtained (See Dykstra table 1). This was especially notable since all the seed tubers, including checks, were grown in Crossville, Tenn., on the Cumberland Plateau. In some years, Tennessee-grown seed potatoes do not give maximum yield of the variety compared with that of the same variety obtained from the North.

A test of the same seedlings was planted in Baton Rouge. Due to damage caused by an early freeze and planting in a heavier soil not as well adapted to potato production, the yield of the same seedlings in Baton Rouge was lower than that in Port Sulphur.

Another replication of the same test was planted in New Road, La. After the plants were about a foot high the vines were killed by an early frost. When they recovered and started new growth, the vines were killed once more. As a result, the tubers were small at digging time, and the yields of U.S. No. 1 tubers was very low. For this reason the yield of this test is not recorded.

Enough tubers of more advanced seedlings were sent to cooperating Southern States to plant in replicated yield plots. The performance of these are recorded in the reports of these States.

Tubers from 20 of the highest-yielding seedlings from the 1956 spring plot in Port Sulphur were saved and used as seed to plant again as a yield plot in the fall in the same location. Ordinarily, only whole tubers are planted as seed for a fall crop. Since soil temperature at planting time in the fall is very high, cut seed generally rots in the soil within a few days after planting. Potato growers in Louisiana claim that cut seed cannot be used in the fall.

The tubers to be planted were cut and suberized by keeping the seedpieces, immediately after cutting, in a humid atmosphere at 70° F. for 48 hours. These seedpieces were then stored at 60° F. for 3 weeks prior to planting.

Dykstra table 1.--Total yield in bushels of U. S. No. 1 potatoes per acre, on basis of performance of seedlings in plots 1/600 of an acre in Port Sulphur and in Baton Rouge, La., 1956. 1/

Accession No. T.L.	Parentage	Yields in P/Sulphur	Yields in B/Rouge	Solids
		Bu.	Bu.	Pct.
TL 3674	B446-54 x Teton	576	210	16.5
TL 1859	Pontiac x 96-56	575	350	19.7
TL 3769	Kennebec x B522-33	569	320	16.5
TL 6092	La Soda x B2368-4	467	-	18.9
TL 5413	B922-18 x B929-32	462	200	16.5
TL 6077	Triumph x B2368-4	460	161	17.4
TL 5482	B2326-4 x B2368-2	457	248	17.4
Kennebec		435	260	17.9
TL 3633	I961 x B55T	430	110	17.2
TL 6088	La Soda x B2368-4	420	208	17.7
TL 5001	B874-35 x B2131-3	413	107	16.9
TL 5384	B606-67 x B929-32	412	134	16.0
TL 5350	B922-24 x B929-32	407	130	17.2
TL 5347	B922-24 x B929-32	400	213	16.9
TL 4893	I1028 x B81-T	389	135	16.9
TL 4819	870 x B929-16	382	164	18.2
TL 6178	B874-24 x Ia947-10	382	86	17.9
TL 3655	I930 x B104T	385	120	20.2
TL 6279	1859 selfed	-	376	17.2
Boone		370	154	18.4

1/ Seed for all selections was grown at Crossville, Tenn.

Dykstra table 1.--continued

Accession No. T.L.	Parentage	Yields in P/Sulphur	Yields in B/Rouge	Solids Pct.
		Bu.	Bu.	
TL 5283	B2326-4 x B2368-4	320	86	19.9
TL 6042	B355-24 x B3160-12	300	65	-
TL 5285	B2326-4 x B2368-4	285	176	17.9
TL 6199	Ia976-3 x Ia947-10	280	170	17.2
TL 5248	B2326-4 x B2368-2	272	31	-
TL 6035	B2219-1 x 96-56	270	90	16.9
TL 5207	2778 x B929-32	270	114	-
TL 4112	Kennebec selfed	260	186	16.7
La Soda		257	162	16.0
TL 4411	B606-37 x B56-1	250	156	-
TL 5423	B922-3 x Menominee	240	150	17.2
TL 6181	B874-24 x Ia947-10	220	127	17.7
TL 6080	B874-24 x Ia 947-10	214	40	17.3
TL 5021	B874-35 x B2131-3	194	119	17.4
TL 6141	B2875-8 x Ia 947-10	192	75	18.9
TL 5252	B2326-4 x B2368-2	190	155	17.2
TL 6137	B2875-8 x Ia 947-10	170	-	18.9
TL 5258	B2326-4 x B2368-2	140	50	-
TL 5259	B2326-4 x B2368-2	120	-	-
TL 5334	B2326-4 x 528-170	120	134	16.0
Triumph		102	75	16.2
TL 5314	B2326-4 x 2162-18	100	-	-
TL 5266	B2326-4 x B2368-2	85	117	17.9
TL 6147	B2993-4 x Ia947-10	80	75	17.4
TL 5327	B2326-4 x 2162-18	42	42	17.2

By this time the pieces were firm and sound, and a solid layer of cork had developed over the cut surfaces. The plot was planted on September 1, and a perfect stand resulted. About 5 weeks after planting, hurricane Flossy appeared, and in a comparatively short time 14 inches of rain fell. The yield plot and other fields were completely submerged slightly in excess of 24 hours. The damage caused by this and the extended severe drought following it varied considerably depending upon the seedling. On November 22, the vines were killed by frost, and the plot was dug a few days later. The yields obtained are not a true index of the yielding potentialities of the seedlings, but the stand and yields are recorded (see Dykstra table 2) to show the marked variation of seedlings in tolerance to very adverse growing conditions. In the South, frosts, heavy rains, and severe drought occur frequently, and it is most desirable to have for this area potato varieties that can still produce a satisfactory yield under these adverse growing conditions.

Dykstra table 2.--Fall yield test planted September 1 with seed from spring test at Port Sulphur, La., 1956.

	Stand			Average		Total Yields of U.S. No.1 lb.
	Rep. 1 no.	Rep. 2 no.	Rep. 3 no.	stand no.	Stand Pct.	
Kennebec	12	25	25	21	84	44.6
TL 1859	19	23	24	22	88	43.8
TL 6279	2	21	11	12	48	27.1
TL 5482	17	18	21	19	76	24.0
TL 6088	14	24	20	19	76	24.0
TL 3769	16	17	11	15	60	19.9
TL 5384	19	22	22	21	84	18.7
TL 4112	6	23	20	16	64	14.6
TL 3655	15	5	15	12	48	13.0
TL 3674	7	14	16	12	48	12.7
TL 6077	14	14	16	15	60	11.4
TL 5283	6	19	16	14	56	9.5
La Soda	18	14	20	17	68	9.0
TL 4819	11	7	18	12	48	8.4
TL 6092	2	11	17	10	40	8.5
TL 3633	14	18	21	18	72	7.5
TL 6035	10	15	11	12	48	6.2
TL 5414	10	12	8	10	40	4.2
Triumph	6	15	15	12	48	3.8
Boone	0	6	6	4	16	3.7
TL 5001	3	9	3	5	20	3.2
TL 5347	11	12	1	8	32	1.1
TL 6178	0	3	4	2	9	1.0

Tubers from 50 seedlings selected for scab resistance were sent to Fort Meyers, Fla., to be tested for adaptability and degree of scab resistance. These were planted in a field that had not produced any marketable potatoes on account of scab. This year, even the susceptible checks were free from scab pustules. The curious thing is that at Port Sulphur, La., where a similar plot was planted this spring in a field severely infested with the scab organism, practically no scab lesions developed. This fall the same seedlings were planted again in the same plot, and this time excellent scab infection occurred.

In Baton Rouge where seed pieces of seedlings were planted in the lath house in 4-inch pots filled with vermiculite previously mixed with cultures of the scab organism, good infection in susceptible varieties occurred.

Since late blight and scab are the two most serious potato diseases to combat in the South, all crosses are made for the purpose of developing seedlings resistant to either one or both of these diseases. Streptomyces scab-
ies infested vermiculite has proved to be an effective medium to test seedlings for degree of resistance to scab. This disease is not too sensitive

to variation in climatic conditions, and infection by this method has consistently been obtained. This is supplemented by field testing.

Late blight epidemics cannot always be successfully obtained in Louisiana, on account of high temperature prevailing in the State. For this reason we are limited in testing seedlings for resistance to this disease. An air-conditioned moist chamber, similar to the one described by W. Hoyman, is now being constructed in the greenhouse. This should enable us to obtain uniform infection regardless of outside temperature.

In most years good success can be obtained in making crosses in the potato-breeding plots at Crossville, Tenn. This has been true especially since we used the method of collecting pollen developed by J. R. King, of the Louisiana Agricultural Experiment Station. By using this technique an abundance of pollen is always available to make the crosses. The summer of 1956 appeared to be ideal for crosses: the temperature was not too high, and sunshine was prevalent most of the time during the 2 weeks crossing period. More than 1,000 clusters of flowers were pollinated, since we had several desirable parents and also an abundance of pollen. Crosses were made early in the morning, in the middle of the day, and late in the evening. Contrary to our expectations, under apparently ideal conditions for seed setting, a very low percentage of seed balls developed.

In 1955 a high percentage of seedballs was obtained. The climatic conditions prevailing during the crossing period in the 2 years were quite similar, with the exception of frequent showers during this period in 1955.

A source-of-seed test on effect of location on vigor of seed was started in 1955 in cooperation with Colorado, Nebraska, North Dakota, and Florida, Alabama, Texas, and Louisiana. It was conducted again in 1956, and will be continued for at least another year.

U. S. - Colorado Potato Field Station
Greeley, Colo.
W. C. Edmundson

Potato breeding studies for 1956 consisted of breeding both red and white varieties for scab resistance with good cooking quality. Some of the parent material was supplied from Beltsville; to this was added the most promising scab-resistant lots developed at Greeley. Many of the parent lots were selected for earliness, and high specific gravity.

The 1956 tests included first-year seedlings in family lines, second-year seedlings in 5-hill lots, increase lots of 32 hills and 100 hills, testing of older seedling on a field basis, and a yield test of seedlings.

In addition to the test plots at the Station, seed of all lots planted in the 32-hill plots and the 100-hill plots were supplied to the Colorado A & M College for testing in other parts of the State. The same lots were also supplied to Dr. L. A. Schaal for scab resistance studies.

The growing season of 1956 was fairly favorable for potato production. The yield per acre was about normal, and the quality of the crop was very good. The percentage dry matter of the seedlings and varieties grown at the station was about normal. The appearance, or finish, of the tubers was especially good. The weather for the most part was hot and dry. The supply of irrigation water from stream and reservoir was below normal, and many irrigation wells of the district were low. Water from the Grand Lake Diversion Project was available, and many growers purchased water brought to the eastern slope of the Rockies by the newly completed tunnel.

There was 6.13 inches of rain recorded at the station from April 1 to the end of the growing season. No late blight was noted at the station and only a small amount of early blight was observed. Four sprays and one aerial dusting were applied. Dieldrin was applied to the soil after planting for the control of the potato flea-beetle. Very little flea-beetle injury was observed on the tubers in any of the seedling plots. However, flea-beetle injury is generally less severe in dry seasons than in wet ones, and there was but 0.07 of an inch of moisture recorded for September. There was a rather large population of leaf hoppers and a severe infestation of aphids in both the early and late crop of potatoes in the district. The psyllid population was low according to counts made in the spraying experiment. There was a severe epidemic of leaf roll at the station in 1956. Because of the leaf roll many of the older seedlings were discarded at the station during the growing season. The most promising seedlings were in tests at other locations in the State and will be available for further tests.

Forty-one family lines that were developed at the station from crosses made in the greenhouse were planted in the field on May 14. A number of family lines secured from Iowa were also grown in 1956. A large number of selections were made at time of harvest, of which about 900 will be tested in 5-hill lots in 1957.

In the test of second-year seedlings, 793 were planted in 5-hill lots. Owing to the difficulty of making selections at time of harvest, a large number of seedlings were retained for a more careful examination. The lots were re-examined, and all lots infected with scab, those indicating a tendency to growth crack, or having other objectionable features were discarded. All lots that were retained for further tests will be planted on a tuber-unit basis in 32-hill lots at the station in 1957. These lots will also be tested for scab resistance in infested soil. The remaining tubers of each lot were retained. They will be tested by cooperators of the staff of Colorado A & M College. Of the older seedlings 180 were planted in 32-hill lots on a tuber-unit basis. Thirty-five seedlings were planted in 100-hill lots; others were planted on half-row or in full-row plots. There was considerable leaf roll in some of the increase lots. The lots that contained the leaf roll were discarded in mid-season and the plants removed. The lots that contained only mild leaf rolling were retained for testing next year.

Seed from 56 crosses was planted in the greenhouse August 6. About half of the lots were from crosses made last spring in the greenhouse, and the other half was seed produced the previous year. Most of the lots of seed produced in the greenhouse last spring germinated fairly uniformly and only a few days later than the year-old seed. The seedlings were potted the last of August. Seed from 14 crosses in which red parents were used were included in the plantings. A list of red parent crosses, together with the number of dark red, medium red, light red, and white tubers produced, is given in Edmundson table 1.

Edmundson table 1.--Yield test, Greeley, Colo., 1956

Cross No.	Parentage	Dark red	Medium red	Light red	White	Total
33	C.S. 12623R x B 381-2R	5	21	174	39	239
34	C.S. 10999R x B 381-2R	7	27	212	52	298
35	C.S. 11013R x CS 12623R	9	29	191	36	265
36	C.S. 12621R x B 2368-11R	6	25	134	16	181
37	C.S. 12621R x C.S. 10999R	0	11	77	9	97
38	B 2067-1R x C.S. 10999R	1	10	85	4	100
39	C.S. 12623R x C.S. 10999R	6	23	76	2	107
40	C.S. 12583R x B 381-2R	2	20	88	0	110
41	B 381-2R x C.S. 12621R	5	7	75	35	122
42	C.S. 11002R x C.S. 12623R	4	13	92	17	126
43	B 381-2R x C.S. 10999R	3	7	70	5	85
44	C.S. 11011R x B 2368-11R	2	11	94	12	119
45	B 381-2R x C.S. 12623R	5	19	81	18	123
46	C.S. 12542R x B 381-2R	0	11	71	19	101

Twenty-eight seedlings and varieties were included in a yield test plot. The plot consisted of 25-hill lots randomized and replicated 5 times. The tubers were graded for sizes above and below 1 7/8 inches in diameter. Tubers from each of the 5 replications were used to determine the specific gravity of each of the seedlings or varieties. The data for yield, specific gravity, and dry matter are given in Edmundson table 2.

Edmundson table 2.--Yield test, Greeley, Colo., 1956.

Variety	Mean total yield per acre Bu.	Mean above 1 7/8" per acre Bu.	Mean specific gravity	Dry matter Pct.
CS 10670	353.3	297.2	1.074	18.4
CS 11012	507.2	369.8	.082	20.1
CS 11591	286.5	229.4	.088	21.4
CS 11726	315.6	271.0	.081	19.9
CS 11730	485.9	407.5	.083	20.4
CS 11863	467.5	416.2	.073	18.1
CS 11888	430.8	405.6	.076	18.9
CS 11889	386.2	363.0	.078	19.4
CS 11918	418.2	398.8	.084	20.4
CS 11931	273.9	224.6	.078	19.4
CS 12240	600.2	518.8	.087	21.1
Triumph	599.2	574.0	.072	17.9
Boone	513.0	477.2	.074	18.4
CS 12969	568.2	482.1	.080	19.6
CS 13035	356.2	280.7	.068	17.2
CS 13091	522.7	408.5	.082	20.1
CS 13153	599.2	500.5	.095	22.9
CS 13178	546.9	524.7	.085	20.9
CS 13222	529.5	424.0	.086	20.9
CS 13240	501.4	456.9	.071	17.9
CS 13622	380.4	390.4	.083	20.1
CS 14014	336.9	259.4	.081	19.9
CS 14025	460.8	426.9	.084	20.6
CS 14102	447.2	352.4	.081	19.9
CS 14143	474.3	401.7	.070	17.4
Red Pontiac	632.1	598.2	.072	17.9
Katahdin	608.9	590.5	.082	20.1
CS 12404	359.1	273.0	.075	18.1
LSD at 5%	43.2	42.2	0.0019	
LSD at 1%	58.4	57.0	0.0026	

A number of the older seedlings that have been tested at different locations in the State appear to be very promising, and one or two may be introduced in the near future. Some of the seedlings are now being increased by seed growers.

ALASKA
C. H. Dearborn

Twenty-nine potato varieties or numbered selections were introduced from the States in 1956 and increased in an isolation block. Although the volume harvested from such a planting was small it reflected a few points of interest.

Wisconsin selection X143-52 and Eigenheimer were the only varieties that equalled or exceeded Green Mountain in dry-matter content. Red Beauty developed the finest appearing red-skinned tubers of any red variety ever grown in Alaska. Two tuber units of Jossing succumbed to foliage disorder that resembled rugose mosaic. Triangular lesions one quarter inch long developed in the skin of the apical end of the tuber. Upward rolling of the epidermis was conspicuous following the skin break.

Potato seed was obtained from 14 crosses made at Matanuska involving quality, scab resistance, skin toughness, earliness and frost hardiness. Some of this seed will be planted in 1957.

Approximately 8,000 seedlings were grown from seed in 1956. Twenty crosses from Iowa were screened for desirable phenotypes.

Progenies from 9 crosses originating from joint efforts with personnel at Beltsville, Md., and Orono, Maine, were screened for desirable horticultural characteristics pursuant to scab testing. In addition, seedlings were grown from 7 Alaskan crosses aimed at scab resistance and quality. Selections from the more desirable types were placed in storage for detailed evaluation.

Approximately one hundred seedlings out of 1,700 planted in the scab test at Fairbanks showed sufficient resistance to warrant further study.

A foliage burn of potatoes reported in 1955 has been corrected by increasing the potash supply to the plant either through additions to the soil or foliar sprays. Zinc and manganese may still be inadequate for best growth but neither has been as influential on top growth as potassium. It seems significant that Green Mountain succumbs to leaf burn resulting from low soil potash whereas Kennebec develops well in the same environment.

Hard freezes during commercial harvesting operations injured many tubers and has resulted in a high percentage of grade-outs from storage. Probably storage losses will be as high as in the past, but will be spread more uniformly among the growers.

In the past ring rot has accounted for heavy storage losses in a few storages. The increasing use of certified seed is becoming apparent in correcting this type of storage loss.

A variety from a cross between Minn. 114.42-3-44 x (X792-94) made in 1947 by Fineman is being released to our Crop Improvement Association this spring. Its purpose in Alaska is to fill a need for a high quality potato. This selection is very high in total solids, remains white after cooking and yields about 60 percent as much as Green Mountain. Since its yields are low it will probably never be of commercial value. Its place is in the home garden until its yielding capacity can be increased.

CALIFORNIA
Glen N. Davis

Potato test plots were located in Kern, San Benito, and Siskiyou Counties, Calif., in 1956.

Three test plots were in Kern County, two of them at the U. S. D. A. Cotton Station at Shafter, and the third at Tehachapi. The variety yield test at Shafter included 15 named varieties and 2 numbered seedlings. White Rose was used as the check. Data presented in Calif. table 1 show that the check was outyielded significantly by Pontiac and Cherokee. No varieties were significantly lower in yield than the check. The amount of seed available at planting of 4 varieties and 2 seedlings limited the number of replications which could be planted. These were not included in the analysis of the data.

Calif. table 1.--Potato variety yield test, Shafter, Calif., 1956.

Variety	Mean yield 5 rep.	Specific gravity	Solids
	Lb.		Pct.
White Rose ck.	35.4	1.081	19.9
Sebago	40.0	1.077	19.0
Delus	28.0	1.095	23.0
Merrimack	32.2	1.097	23.2
Sequoia	44.6	1.089	21.7
Pontiac	58.8	1.083	20.4
Cherokee	47.2	1.083	20.4
Saco	40.2	1.082	20.2
Katahdin	43.6	1.086	20.9
Redkote	40.0	1.090	21.8
Kennebec	38.8	1.086	20.9
*3457-2	8.4	1.089	21.7
* 3458-12	10.0	1.074	18.4
*Keswick	38.7	1.087	21.2
*Canso	29.0	1.086	20.9
*Boone	24.0	1.074	18.4
*Plymouth	38.5	1.090	21.8
L.S.D. 5%	9.4		

* Not included in analysis.

Size of plot=0.10 acre.

Fertilizer = 16-20-0 - 600 lbs. per acre.

Five replicates of 25 seed pieces.

The scab-resistance test plot at Shafter in 1956 included 9 seedlings and the White Rose check. The data are presented in Calif. table 2. Seedlings 3457-2, 3456-2 and 3458-12 which were outstanding in 1955 again looked very promising in 1956.

Calif. table 2.--Scab test plot, Shafter, Calif., 1956.

Variety	Number tubers	Number tubers in class rating							Ave.	Mkt. % Pct.
		0	1	2	3	4	5	6		
White Rose ck.	57	0	7	12	32	11	3	2	3.4	31
3457-2	61	7	42	7	5	-	-	-	1.1	90
3456-2	388	64	232	50	34	8	-	-	1.2	89
3458-12	52	6	33	4	9	-	-	-	1.3	82
3454-5	56	0	21	10	14	6	5	-	2.3	55
3453-2	81	0	18	20	31	12	-	-	2.4	47
2428-11	43	0	13	7	15	4	4	-	2.5	46
3454-14	58	0	5	8	19	22	4	-	3.2	22
3140-36	42	0	2	6	10	16	8	-	3.7	19
3428-20	49	0	0	0	13	22	8	6	4.1	0

* Classes 0-1 and 2 marketable

Key to classes of scab

0 = free from scab

1 = 1% of surface area covered with scab.

2 = 5% " " " "

3 = 15% " " " "

4 = 25% " " " "

5 = 35% " " " "

6 = 60% " " " "

Size of plot = 1/40 acre

Fertilizer = 16-20-0 at 600 lbs. per acre.

The Kern County plot at Tehachapi was planted primarily to test for Verticillium wilt resistance, yield, and quality. Six named varieties and twenty-nine seedlings were included (table 3). Varying amounts of seed prevented the planting of a uniform number of replications. No analysis of the data was attempted. Unfortunately, the plot was on a piece of land heavily infested with common scab. Most of the material was highly susceptible to scab and the results obtained were far from enlightening.

Calif. table 3.--Potato test plot, Tehachapi, Calif., 1956.

Variety	Yield					Specific gravity	Solids
	Rep.1	Rep.2	Rep.3	Rep.4	Mean		
	Lb.	Lb.	Lb.	Lb.	Lb.		Pct.
A180-30	15.0	4.5	-	-	9.7	1.081	19.9
A104-50	21.0	27.5	-	-	24.2	1.074	18.4
A119-8	15.5	13.5	-	-	14.5	1.074	18.4
A223-18	9.5	-	-	-	9.5	1.075	18.7
A170-5	29.0	-	-	-	29.0	1.074	18.4
A183-5	12.0	23.0	-	-	17.5	1.066	16.7
A180-24	37.0	-	-	-	37.0	1.070	17.4
A104-1	27.0	15.0	-	-	21.0	1.080	19.7
A175-6	14.5	-	-	-	14.5	1.065	16.5
A101-17	10.5	12.0	17.0	20.0	14.7	1.070	17.4
A180-25	19.5	22.0	-	-	20.7	1.071	17.7
A119-15	14.5	17.0	11.0	27.0	17.4	1.084	20.5
B3199-19	15.0	17.5	-	-	16.2	1.082	20.2

continued

Calif. table 3, continued.

Variety	Yield					Specific gravity	Solids
	Rep.1	Rep.2	Rep.3	Rep.4	Mean		
	Lb.	Lb.	Lb.	Lb.	Lb.		Pct.
Sequoia	19.0	15.5	-	-	17.2	1.066	16.7
A1-10	11.5	-	-	-	11.5	1.070	17.4
A129-11	18.0	-	-	-	18.0	1.073	18.2
B 3206-2	13.5	15.5	-	-	14.5	1.081	19.9
X792-38	13.5	13.5	-	-	13.5	1.067	16.9
A128-5	18.5	-	-	-	18.5	1.074	18.4
B595-76	24.5	11.5	-	-	18.0	1.093	22.4
B2102-11	16.5	-	-	-	16.5	1.080	19.7
B3189-6	6.0	6.5	-	-	6.2	1.078	19.2
A205-9	7.0	7.0	-	-	7.0	1.068	17.2
Ontario	18.5	19.5	-	-	19.0	1.075	18.7
Empire	14.5	16.0	-	-	15.2	1.075	18.7
A200-3	15.0	18.0	-	-	16.5	1.071	17.7
A164-1	8.0	17.0	-	-	12.5	1.078	19.2
B3428-29	33.5	30.0	-	-	31.7	1.079	19.4
Furore	15.0	20.5	-	-	17.7	1.086	20.9
A180-23	14.0	5.5	-	-	9.7	1.071	17.7
A124-116	21.0	12.5	-	-	16.7	1.078	19.2
A167-3	11.0	15.0	-	-	13.0	1.067	16.9
A117-58	27.5	29.0	19.0	-	25.1	1.082	20.2
Menominee	18.0	18.5	-	-	18.2	1.081	19.9
Russet Burbank	24.8	18.0	19.0	17.0	19.7	1.080	19.7

Size of plot - 1/10 acre.

Fertilizer - 16-20-0 600 lbs. per acre.

Each replicate - 25 seed pieces

The purpose of the plot in San Benito County was to test varieties and seedlings for yield, chipping quality, and resistance to verticillium wilt. The varieties, Kennebec and Canadian Russet and 11 seedlings were planted in 1955 (Calif. table 4). Varying amounts of seed made impracticable the planting of a uniform number of replications. As a result, no analysis of the data was attempted. Samples from 4 lots which looked most promising in the field were given a commercial chipping test. Lots 175-6 and 104-50 made chips which were too dark in color to be desirable. On the other hand, Canadian Russet and lot No. 180-25 gave very attractive chips which would be quite acceptable to the trade.

Calif. table 4.--Potato test plot, Hollister, 1956.

Kind	No. reps.	Mean	Specific	Solids	Days from planting to decline of vines
		wt. Lb.	gravity		No.
Kennebec	5	35.5	1.070	17.4	88
Canadian Russet	3	43.7	1.081	19.9	88
101-17	5	51.5	1.088	21.4	98
104-1	4	50.2	1.079	19.4	97
104-50	4	48.7	1.078	19.2	97
119-8	4	41.6	1.091	21.9	99
119-15	5	42.4	1.082	20.2	94
170-5	2	53.2	1.082	20.2	93
175-6	3	57.5	1.074	18.4	91
180-24	5	51.8	1.075	18.7	93
180-25	4	49.2	1.079	19.4	93
180-30	3	31.5	1.079	19.4	100
223-18	1	42.0	1.077	19.0	88

Size of plot - 1/10 acre.

Fertilizer - ammonium sulphate at 600 lbs. per acre.

Each replicate - 25 seed pieces

The season of 1956 was unusually cool and differences in number of days from planting to death of vines of the various lines were small. The proportion of the differences due to natural maturity and that due to attack by the verticillium wilt organism is difficult to determine.

Twelve varieties were planted at Tulalake, Siskiyou County, for a yield and quality test. Russet Burbank was considered the check. Data presented in Calif. table 5 show the check was significantly outyielded by the varieties Sequoia, Katahdin, and Saco. No varieties were significantly below the check in yield. Seed was not available for the full 5 replications of 5 of the varieties included. These were not included in the analysis of the yield data.

Calif. table 5.--Potato variety yield test, Tulalake, Calif., 1956.

Kind	Rep.1	Rep.2	Rep.3	Rep.4	Rep.5	Mean	Specific	Solids
							gravity	
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.		Pct.
Russet Burbank	50.0	35.5	41.0	43.0	43.0	42.5	1.084	20.4
Cherokee	41.5	29.0	34.5	42.5	47.0	38.9	1.073	18.2
Redkote	31.0	27.0	29.0	42.5	46.0	35.1	1.070	17.4
Sequoia	36.5	40.5	50.5	57.0	56.0	48.1	1.074	18.4
Merrimack	36.0	44.0	54.5	45.0	50.0	45.9	1.080	19.7
Katahdin	50.0	43.5	53.0	48.5	55.0	50.0	1.078	19.2
Saco	28.0	54.0	42.0	57.0	58.0	47.8	1.085	20.7
*Delus	22.5	42.5	38.0	44.0	-	39.0	1.081	19.9

continued

Calif. table 5, continued.

Kind	Rep.1	Rep.2	Rep.3	Rep.4	Rep.5	Mean	Specific gravity	Solids
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.		Pct.
*Mohawk	50.0	49.0	40.0	-	-	49.3	1.077	19.0
*Sebago	45.0	46.0	45.0	-	-	45.3	1.064	16.2
*Ontario	43.5	52.0	-	-	-	47.7	1.067	16.9
*Menominee	35.0	-	-	-	-	35.0	1.078	19.2
L.S.D. 5% between means						8.75		

*Not included in analysis

Size of plot - 1/15 acre.

Fertilizer - ammonium sulphate - 600 lbs. per acre.

Each replicate 25 seed pieces

Breeding for scab resistance.

Several crosses were made in the greenhouse during the winter of 1955-56. Menominee and seedling 3457-2 were used as resistant parents, and White Rose as the desired commercial parent. Seed from the crosses was planted in the greenhouse in 6-inch pots in August 1956. Small tubers from approximately 150 seedling lines are available for testing in the field during 1957.

CANADA

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N. M. Parks, Senior Horticulturist

The varieties and seedlings listed in Canada table 1 were included in adaptation tests at several stations across Canada in 1956. Reports have not come in yet from all stations at which they were tested, therefore, this is only a preliminary report.

The 1956 growing season in Canada varied greatly from area to area, ranging from very dry to excessive rainfall in some districts. In certain provinces and areas conditions for growth of potatoes in the late season were ideal. No killing frosts occurred until the latter part of October resulting in retarded maturity, second growth, and heavy yields of misshapen, oversized, rough, immature, hollow hearted tubers. These conditions of growth tended to bring out weaknesses in seedlings and varieties which probably would have been difficult to detect or assess under normal conditions.

Canada table 1.--Report on performance of potato varieties and seedlings obtained from the U.S.D.A. and plant breeders in the United States for evaluation through the National Potato Variety and Seedling Trials, Canada, 1956.

Station and variety	Maturity	Yielding ability	Total solids Pct.	Remarks
<u>Agassiz, B.C.</u>				
Pungo	Med. late	Fair	18.6	Plant compact, tubers white skin, smooth, blocky type.
Boone	Very late	High	16.4	Plant erect growth, darkened stalks, tubers white, skin smooth, blocky type.
Delus	Med. late	Fair	19.5	Tubers white skin, roundish type, some internal break down.
Saco	Med. late	"	19.7	Plant compact to spreading, tubers white, round.
Plymouth	Intermediate	"	18.0	Plant low spreading, tubers white, round, eyes shallow, slightly russeted.
Merrimack	Late	"	17.9	Plant erect, vigorous, tubers white skin, round to flat, deep eyes.
Antigo	Early	"	18.5	Plant low spreading, tubers white skin, round, not uniform in types, deep stem end.
Red Beauty	Medium	Low	19.9	Plant very small, low, tubers red skin, blocky, uniform.
Osage	Late	High	16.9	Plant erect compact, tubers white, oblong type, uniform.
Netted Gem ^{1/}	"	Poor	18.0	Tubers rough, misshapen.

continued

Canada table 1, continued.

Station and variety	Maturity	Yielding ability	Total solids Pct.	Remarks
<u>Morden, Man.</u>				
Delus	Late	Fair	21.7	Tubers creamy white skin, rough, lack uniformity.
Ossage	Early	Poor	18.8	Early maturity, attractive tubers, oblong in type, white skin.
Redkote	Late	Fair	18.1	Tubers oval to blocky, skin attractive bright red.
Osseo	Early	Good	13.0	Tubers blocky to oblong, skin creamy white.
I. Cobbler ^{1/}	"	"	19.6	Standard variety used for comparison.
<u>Smithfield, Ontario</u>				
Antigo	Late	"	17.2	Variable type appears quite resistant to scab.
Red Beauty	"	"	17.5	Tubers rough, not uniform in size or type.
Boone	Very late	Heavy	16.2	Heavy vines, long stolons, tubers rough, a lot of second growth.
Dazoc	Medium	Good	17.9	Tubers bright red skin, very uniform and attractive.
Delus	Late	Heavy	18.9	Tubers extremely large and rough, variable type.
Osage	"	Good	17.7	Tubers rough.
Redkote	"	High	16.5	Tubers round type, skin a pale red, long stolons.
Saco	Very late	Good	19.3	Tubers large, rough, high percentage second growth.
Plymouth ^{1/}	Intermediate	"	17.6	Tubers rough, not uniform in type.
Katahdin ^{1/}	Late	High	16.2	Standard variety for comparison.
Merrimack	Very late	Very high	18.1	Extremely late, very heavy yield, fibrous root system, extremely heavy crop of seed balls.
<u>O.A.C. Guelph, Ontario Department of Field Husbandry</u>				
Antigo	Medium	Good	18.1	Uniform, smooth tubers, a high percentage of which were marketable.
Boone	Very late	High	17.6	Tubers large, smooth, cook white but soggy.
Delus	Late	High	21.4	High yielding with excellent cooking quality, tubers large, smooth and uniform.
Dazoc	Early	Good	17.4	Tubers attractive dark red skin, tendency to be rough with deep eyes.

continued

Canada table 1, continued

Station and variety	Maturity	Yielding ability	Total solids Pct.	Remarks
<u>O.A.C. Guelph, Ontario</u> <u>Department of Field Husbandry</u>				
Osseo	Early	High	16.8	Tubers cobbler type, but a little smoother and shallower in eyes.
Osage	Medium	High	19.8	Long, oval, smooth, shallow eyed tubers, tendency to hollow heart.
Onaway	Early	Good	17.6	Tubers bright and uniform, a little after-cooking darkening, Cobbler maturity.
Merrimack	Late	High	20.6	Tubers irregular in shape, medium size, skin slightly flaked.
Plymouth	Late	High	18.7	Tubers oblong, smooth, flaked skin, good cooking quality.
Redkote	Early	High	17.4	Tubers round, uniform in shape, cooks soggy.
Redglo	Medium	Good	18.1	Medium red tubers, blocky, irregular in shape, slightly russeted, good cooking quality.
B 75-4	Early	High	18.3	Tubers round in shape, smooth, some growth cracks, good cooking quality.
B 355-35	Late	High	18.7	Tubers somewhat flattened in shape, skin slightly flaked, good cooking quality.
Katahdin ^{1/}	Late	Good	18.5	Standard variety used for comparison.
<u>Charlottetown, P. E. I.</u>				
Antigo	Late	Fair	14.2	Sebago type of tubers, smooth, very attractive.
Boone	Intermediate	High	13.3	Tubers large, smooth, very attractive.
Osage	Late	Good	14.7	Tubers G. Mountain type, smooth & attractive in appearance.
Delus	Medium	Good	14.7	Tubers cream colored skin, Sebago type, uniform in size.
Redkote	Late	High	13.7	Tubers skin deep pink similar to Pontiac, Cobbler type, smooth.
Red Beauty	Very late	High	14.0	Tubers skin red, Sebago type, very attractive tubers.
Plymouth	Intermediate	High	14.5	Tubers Sebago type, smooth, uniform and attractive.
G. Mountain ^{1/}	Late	High	14.6	Standard variety used for comparison.

^{1/} Standard variety used for comparison.

CONNECTICUT
Arthur Hawkins

Potato Variety Tests in Connecticut, 1956

Two potato variety tests were conducted by the Storrs Agricultural Experimental Station, Storrs, Conn., on commercial potato farms in the Connecticut River Valley in Connecticut in 1956. Experimental procedures, observations on verticillium wilt, shape of tubers, susceptibility to hollow heart are indicated in footnotes to Conn. tables 1 and 2 of yield and dry matter.

The relatively cool season, along with irrigation when needed, resulted in tubers of satisfactory shape for the most part. Saranac showed the least amount of verticillium wilt. B 962-32 tubers from both locations developed drought spot, while B 2368-4 from one location showed considerable drought spot.

Conn. table 1.--Yield^{1/} and specific gravity of potato varieties and seedlings Windsorville, Conn., 1956.

Variety or seedling ^{2/}	Total yield per acre	Yield per acre, over 1 7/8"				Dry matter
		Free of serious off shape				
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
(9" spacing except*)						
Green Mountain	763	92.8	708	91.6	699	19.3
Houma (15")*	676	90.3	610	90.3	610	17.9
Katahdin	602	91.6	551	91.6	551	17.2
Kennebec	722	92.3	666	90.5	653	18.3
Keswick	491	91.7	450	91.7	450	19.1
Manota	637	93.2	594	93.2	594	18.1
Rukat	625	90.7	567	90.7	567	17.7
Saranac (12")*	764	78.9	603	78.9	603	18.1
Sebago (Russet)	583	94.0	548	94.0	548	16.7
Sebago (Smooth)	557	93.5	521	93.5	521	17.6
Teton	736	95.4	702	95.4	702	17.3
B 69-16	599	91.4	547	90.2	540	17.9
B 605-10	556	94.7	527	94.7	527	18.1
B 926-9	655	94.1	617	93.9	615	16.0
B 962-32	519	88.7	461	88.7	461	18.9
B 2368-4 ^{3/}	607 ^{3/}	92.9	564	92.9	564	18.1

1/ Plots: 1 row 21 feet long. Replication: 4, in 4 randomized blocks (3 sections x 4 rows). No sprayer - wheel damage. Soil: Hartford fine sandy loam; tobacco previous 2 years. Fertilizer: 2,500 pounds 6-8-8 in row side bands plus 40 pounds N plowed under. Season and conditions: planted 5/11/56. Relatively favorable season. Irrigation available. Some corn borer damage. On 9/14/56, #5,6,11,13, all dead; #2,10,14 about finished. 10/2/56, Saranac 80% green; freeze shortly after. Verticillium wilt: 9/14/56, Saranac 100% green, 5% verticillium

wilt; Green Mountain 50% green, 50% verticillium wilt; Kennebec, 50% green, 100% verticillium wilt.

2/ Seed supplied from Presque Isle, Maine through cooperation of R. V. Akeley, U.S.D.A., except Rukat and Sebago.

3/ Tuber observations: Hollow heart - B 962-32, 1 in 20. Drought spot - B 962-32, 2 severe drought spot in 20 tubers; B 2368-4 had 3 of 20 tubers with severe and 7 of 20 very severe drought spot.

Conn. table 2.--Yield^{1/} and specific gravity of potato varieties and seedlings, Enfield, Conn., 1956.

Variety or seedling	Total yield per acre	Yield per acre, over 1 7/8"				Dry matter
		Free of serious off shape				
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
(9" spacing except *)						
Boone	785	90.5	711	89.8	705	15.7
Green Mountain	736	89.6	659	87.6	645	18.2
Houma (15")*	666	88.4	589	88.4	589	16.3
Katahdin	654	91.4	598	90.4	592	16.2
Kennebec	661	92.9	614	91.7	606	16.7
Keswick	447	92.9	415	92.9	514	16.8
Manota	664	92.9	617	91.9	610	17.2
Rukat	585	88.3	516	87.5	512	15.8
Saranac (12)*	770	86.2	570	86.2	570	17.1
Sebago (Russet)	635	94.3	599	94.3	599	16.3
Teton	649	94.1	611	94.1	611	15.5
B 69-16	731	91.7	670	89.3	652	17.9
B 605-10	651	92.6	602	90.6	589	16.7
B 926-9	583	89.5	521	86.1	502	14.9
B 962-322	383	88.8	340	88.8	340	17.1
B 2368-4	710	92.7	658	92.7	658	16.8

1/ Plots: 1 row 21 feet long. Replication: 4, in 4 randomized blocks (3 sections x 4 rows). No sprayer - wheel damage. Soil: Enfield fine sandy loam; shade tobacco previous two years. Fertilizer: 180-200-210 in bands plus 40 pounds N sidedress. Season and conditions: Planted 5/11/56, irrigation available. High nitrogen level in soil and amount applied. Frost killed relatively early, Sept. 21. Verticillium wilt: 9/14/56 - Saranac 100% green, 25% verticillium wilt; Boone, 90% green, 30% verticillium wilt; Katahdin 60% green, 80% verticillium wilt; Green Mountain, 70% green, 60% verticillium wilt; Houma, B-962-32 and B 926-9 most dead. Manota and B 605-10 dead.

2/ Tuber observations: Hollow heart - Katahdin, 1 in 20 with hollow heart; Kennebec, 1 in 20; Sebago, 1 in 20; B605-10, 1 in 20; B 962-32, 5 in 20. Drought spot - B 962-32, 5 in 20 severe drought spot.

DELAWARE
E. P. Brasher

A combination trial of variety testing and seed-source study of the Delus variety was conducted at the Delaware Agricultural Experiment Station in 1956. Fourteen varieties and seedlings were tested for yielding ability and dry-matter content. Delus seed, from 3 sources, Maine, home-grown early, and home-grown late, was tested for yielding ability and dry-matter content. The early, home-grown seed was planted in April and harvested in August, and the late home-grown seed was planted in June and harvested in October, 1955.

The experimental conditions and procedure for the trial were as follows:

Location: Univ. Farm, Newark	Fertilizer: 1,400 lb. 8-16-16
Seed source: Maine and home-grown.	per acre, in bands at planting
Soil: Sassafras loam	time. Fungicide: Zineb
Previous crop: Tomato	Insecticide: DDT and parathion.
Plot size: 3' by 25' (29 seed-	Harvesting date: September 6.
pieces per 25-foot row).	Growing conditions: Good
Plot design: Randomized block.	
Planting date: April 12	

The results of the variety test (table 1) show that none of the seedlings produce yields comparable with those of the standard varieties, Katahdin and Irish Cobbler. Of the recently named varieties, Pungo and Delus were outstanding. Saco was the most productive, but a large percentage (41) of its tubers were misshapen and off-grade. Among Pungo, Katahdin, Delus, and Irish Cobbler no significant difference occurred in yield of U. S. No. 1 potatoes. Delus, however, had the largest percentage of its tubers meeting the requirements for No. 1 grade.

In dry-matter content, Delus was significantly better than any other variety or seedling tested except B 926-9. This may partly explain why Delus tubers have been rated so high in chipping tests.

In the seed-source study of Delus, seedstock from Maine was far superior to home-grown seedstocks. The Maine seedstock produced 324 bushels per acre of U. S. No. 1 potatoes, in contrast with 246 bushels for late home-grown, and 165 bushels for early home-grown seedstock. The Maine seedstock also excelled significantly in the production of potatoes of the highest dry-matter content.

Brasher table 1. Variety yield test and seed-source study of the Delus variety, Newark, Del., 1956.

Variety	Seed source	U. S. No. 1 yield per acre		Dry matter
		Bu.	Pct.	Pct.
Saco	Maine	391	59	15.190
Pungo	"	359	85	15.550
Katahdin	"	348	91	13.223
Delus	"	324	92	17.931
Irish Cobbler	"	323	82	14.757
B926-9	"	309	85	12.218
B69-16	"	299	84	17.349
Delus	Home-grown, late	246	89	17.032
Plymouth	Maine	246	82	14.228
Cherokee	"	238	62	13.276
B991-14	"	195	89	14.069
B962-32	"	168	86	14.545
Merrimack	"	166	73	16.027
Delus	Home-grown, early	165	86	16.820
B920-7	Maine	149	69	12.958
B595-76	"	101	79	14.334
L.S.D. at 5%	-	53	-	.692

FLORIDA (Hastings)
A. H. Eddins

Reaction of Potato Varieties and Seedling Selections to Corky Ringspot

Corky ringspot was mild in infested potato fields at Hastings, Fla., in 1956. Growers reported minor damage in a few fields at Federal Point, Hastings, and Elkton.

At 3 locations on the Potato Laboratory Farm 10 potato varieties and 8 USDA seedling selections resistant to corky ringspot were grown in soil infested with corky ringspot. The potatoes were planted January 5 and fertilized with 2,400 lbs./A of 6-8-8 fertilizer. In 3 locations 20 to 24 hills of each variety and selection were grown in rows adjacent to cork-ringspot-susceptible Sebago. The disease appeared in only 2 tubers in 1 plot planted to Sebago in 1 location, and none was seen in potatoes grown in the second location. In 5 plots 1 to 8 tubers of Sebago were affected with the disease, and in 1 plot in the third location 3 tubers of Red Pontiac were affected. None of the tubers of other varieties and selections was affected. Most of these varieties and selections probably escaped the disease.

Potato Variety Trials in 1956
E. N. McCubbin and A. H. Eddins

In 1956, 11 potato varieties and 20 USDA seedling selections were grown and compared for yield and other characteristics at the Potato Investigations Laboratory. No killing freezes occurred, but the growing season was exceptionally dry until the last week in April, or about 10 days before harvest. Plots were irrigated by the water-furrow method as required to supply soil moisture during the dry weather.

Seed of some of the varieties and selections was dormant, or partially so, at planting time (Fla. table 1.) Plant emergence was slow from this seed and growth and development were delayed. It is probable that seed treatment with ammonium thiocyanate would have broken dormancy of the seed and hastened plant emergence and increase yields.

Except for Red Pontiac, none of the varieties and seedling selections significantly exceeded Sebago, the standard variety, in yield. Red Pontiac is well adapted to the Hastings area, but at present there is little demand for Hastings-grown, red-skinned potatoes. Delus, Saco, Boone, and 10 seedling selections produced significantly lower yields than Sebago.

Pungo, Plymouth, B 313-2, 2988, and 6037 produced tubers with heavy russeting and light cracking which gave them a poor appearance.

Fla. table 1. Results of potato variety trials at Hastings, Fla., in 1956.

Variety or selection ^{1/}	Yield per acre	
	U. S. 1A	U. S. 1A + 1B
	Bu.	Bu.
Red Pontiac	335	350
Pungo	298	307
1859	285	304
Cherokee	279	292
Merrimack ^{2/}	265	282
3674	257	297
Sebago	252	270
Kennebeck ^{2/}	252	267
Early Cobbler ^{2/}	249	265
B595-76	243	287
2988	236	251
Plymouth	235	249
3769	233	247
B3010-4	199	219
B313-2	198	207
6037	195	206
B2922-26	191	204
B926-9	190	201
B721-1	186	208
B294-65	184	206
B606-3	183	203
Delus ^{2/}	177	188
3633	176	197
B3428-41	174	191
B3470-31	151	184
Saco	146	163
5413	139	171
Boone ^{2/}	136	163
B3114-52	124	142
4112	97	126
B3471-24	96	134
L.S.D. at 5%	64.6	62.8
1%	85.3	83.0

^{1/} Each replicated 5 times in 12-hill plots; planted January 6 and dug May 2, 1956.

^{2/} Seed partially dormant with slow plant emergence.

Some varieties and selections were rather immature and more prone to skinning and mechanical injuries than others. Those showing most injuries were Early Cobbler, Boone, Delus, and Merrimack. Seed of these varieties were dormant or partially so at planting.

Skin of tubers of 1859 was a pale pink and undesirable unless the tubers were waxed and dyed red before shipment.

Cherokee is a high-yielding variety. It matures earlier than Sebago, has a higher average specific gravity, and is resistant to common scab and late blight. Reports indicate that Cherokee is more prone than Sebago to develop mechanical or handling damage, scald spots, and decay, and that its chips are unequal in color to those of Sebago, especially when the potatoes are stored at 40° to 50° F. ^{1/} It may be used in the Hastings area where Sebago cannot be grown profitably because of scab. Care should be used in handling Cherokee to avoid mechanical injuries, desiccation damage, and soft rot.

^{1/} Kushman, L. J., and R. E. L. Greene. A comparison of Sebago, Cherokee, and Kennebec potatoes in relation to their suitability for shipping and manufacture of potato chips. H.T.& S. Office Report No. 304.

SUB-TROPICAL EXPERIMENT STATION
John C. Noonan

Seedpiece Weight and Spacing Planting

This study was continued for the third year. The land used was typical of the potato land: highly calcareous fine sandy clay with a pH of 8.2 and organic content of 12%. The plots were replicated 4 times and in every case were over-fertilized. (Noonan table 1). The third-year results were similar to those of the two previous years. The 4-inch spacing gave the highest yields in each case.

Noonan table 1. Seedpieces weight and spacing test, Homestead, Fla., 1956.

Seed size	50-pound bags per acre			
	Seed spacing	U. S. No. 1	B's	Oversize
Oz.	In.	No.	No.	No.
1	4	409	30	57
1	6	322	19	83
1	8	317	25	31
1	10	269	18	59
1 1/2	4	483	31	84
1 1/2	6	379	25	91
1 1/2	8	321	26	118
1 1/2	10	279	18	121
L.S.D., 5%		26	9	19
" 1%		36	13	28

IDAHO (Parma)
Roger F. Sandsted

Variety trial. Five advanced selections from the breeding program at the Aberdeen Branch Station were grown in a variety trial in comparison with four standard varieties from the Parma area.

The selections were planted April 17 and harvested August 8. The field plan was a randomized block of 6 replications. Each plot contained 20 seed pieces and a plant spacing of 1 foot in the row and 3 feet between rows. The trial was irrigated. Barley stubble with a Hubam clover cover crop was plowed under in the fall of 1955. Fertilizers were 120 pounds of nitrogen and 60 pounds of P_2O_5 per acre broadcast.

The results from the trial are shown in Sandsted tables 1 and 2.

Sandsted table 1.--Potato variety trial Parma Branch Station, 1956.

Variety	Color	Total Cwt/A	U.S. No.1 over 2"	Small under 2"	Rough & knobs	Growth- cracked	Solids	Plant stand
			Cwt/A	Cwt/A	Cwt/A	Cwt/A	Pct.	Pct.
Triumph	Red	426	343	23	44	16	18.2	97
A 175-7	Russet	392	259	16	32	85	16.9	99
Russet Burbank	"	344	253	39	49	3	19.5	98
White Rose	White	408	253	36	119	0	17.6	98
180-26	Russet	320	203	50	35	32	16.0	97
A 223-21	Red	244	191	25	22	6	16.6	91
Early Gem	Russet	239	153	10	22	54	17.4	86
A 183-8	"	233	152	29	25	26	17.2	84
A 120-5	"	268	134	53	81	0	18.7	100
L.S.D. 5%		8	7	0.5	3	3	0.6	
L.S.D. 1%		10	9	0.6	5	4	0.8	

Sandsted table 2.--Potato variety trial Parma Branch Station, 1956.

Variety	U.S.No.1 over 2"	Small under 2"	Rough & knobs	Growth- cracked
	Pct.	Pct.	Pct.	Pct.
Triumph	81	5	10	4
A 175-7	66	4	8	21
Russet Burbank	73	11	15	1
White Rose	62	9	29	0
180-26	63	16	11	10
A 223-21	78	11	9	2
Early Gem	64	4	9	22
A 183-8	65	13	11	11
A 120-5	50	20	30	0

Triumph, White Rose, and Early Gem showed signs of vine maturity at harvest-time. The tubers of 180-26 and A 183-8 were very heavily russeted. Those of 180-26 tended to be longer than Early Gem. A 120-5 tended to have pointed ends. A 175-7 was subject to growth-cracking, although the cracks were well healed. The tubers of A 223-21 were very bright red, large and blocky with deep eyes in the apical end.

INDIANA
H. T. Erickson

At Purdue we are just initiating an accelerated breeding program and are concentrating on a search for desirable parental lines. The characters that interest us are total solids, yield, scab resistance, resistance to internal browning, chipping quality, and horticultural type.

A request for material was sent out last spring and the following number of lines were received and retained:

<u>Source</u>	<u>Received</u>	<u>Retained</u>
U.S.D.A., Beltsville, Md.	96	28
Plant Introduction, Sturgeon Bay, Wis.	13	0 ¹ / ₂
Colorado	2	1
New Brunswick, Canada	8	2
Wisconsin	31	8
Louisiana	1	1
Ben Pica, N. Dak.	12	3

1/ Damaged by high water.

A detailed report will be made when the promising lines can be further tested. Most of the screening was done with small samples in unreplicated plots.

Among the advanced selections carried by Dr. Ellis I 911-7 looks most promising. It has been completely scab resistant, looks excellent on upland soil, and tends to be a little dark on muckland. Wherever test lots have been distributed to growers it was highly praised for quality. It is russet with a season somewhat later than Irish Cobbler and its yields are similar to that variety.

The cross I 911(B 67-11 x M 133.43) yielded good scab resistance and tuber types. Selection, I 911-2 from this cross has also turned out well, but is low in yield.

The variety Merrimack had good yields and high specific gravity (1.075 on muck) but it tends to get over-size, is too rough in appearance, had considerable internal browning, and cooked dark. This variety is not recommended for planting on Indiana muck soils.

IOWA

August E. Kehr, James Horton, Frank Manzer^{1/}

Dr. James Horton has been appointed to the staff of the Plant Pathology Department of Iowa State College. This position was formerly held by Dr. William G. Hooker. It is expected that the pathological phases of our program will be greatly expanded.

Seed and Seedling Production. Crosses in the greenhouse at Ames during the winter of 1956 were aimed at resistance to scab, late blight, virus X, leaf roll, high yields, and high quality. In addition, a few crosses involved resistance to ring rot, virus Y, and verticillium wilt. Seed production was excellent, and 447 crosses were made with seed amounting to as high as 13,000 seed per cross, or an estimated total of nearly 2 million seeds. Wherever possible crosses were made to pyramid disease resistance, quality, and yields into a single line. This seed will be aged before planting in order to obtain better germination. Thus, most of the seed produced in the spring of 1956 will not be planted until 1957. Any breeder wishing some of this potato seed for his program will receive it upon request, giving resistance desired and amount of seed wanted.

Seed from 1954 crosses was planted in August of 1955, and about 30,000 seedlings were grown, of which about 12,000 survived screening tests for late blight and virus X. From these seedlings almost 10,000 second-size tubers were distributed to stations throughout the country.

With such large quantities of seed available, it will be possible to screen very rigidly in the seedling stage. Emphasis is being placed on developing methods of disease screening in the seedling stage.

Objectives of the Program. The primary objectives of the breeding program were revised so that more emphasis is given in order of importance to (1) Yield (2) quality (3) scab resistance (4) Late blight resistance (5) Immunity to virus X (6) resistance to leaf roll virus. In our late blight work we are working with both the dominant genes from Solanum demissum and the recessive genes which give field tolerance to all races of the organism. A graduate student, Mr. Vilhelm Umaerus, from Upsala, Sweden, is working on a biochemical test to distinguish by means of peroxidase determinations, differences between the so-called major and minor gene resistance, and to measure the level of the latter resistance.

Interspecific hybridization. This phase of the program has received considerable de-emphasis in the past year. The purpose for using wild species in a breeding program is to obtain characters not found within the cultivated species. Thus far in our program, the only characters found in wild species which are not found in Solanum tuberosum are the dominant genes for late blight resistance. We are therefore concentrating largely on crosses of this nature. There is an indication also, however, that we are gaining some heterosis and heat resistance in crosses involving S. chacoense, and S. demissum. In this program crosses were made and about 100,000 seeds were produced.

1/ Allen E. Schark was a co-leader in this project until July 1, 1956.

A selection of *S. antipovicii* x *S. tuberosum* (Iowa S4004) was reported to be immune in Haiti where all other late-blight-resistant lines were killed, including lines resistant to races 0, 12, and 14.

Field Plots. The design of our field plots was changed somewhat this year, in that where sufficient stock was available, an observation plot of 25 hills was planted. Prior years this has been a 10-hill plot. The larger 25-hill plot makes yield data more reliable, and this size plot can be planted in the same block as the regular yield trials, in which each replication is a 25-hill plot. Thus, the 25-hill plots are an advance yield test which gives us yield data a few years earlier than previously. This year there are 74 entries in the 25-hill observation plots and 260 entries in the 5-hill observation plots. All this material had a lush growth and we obtained excellent notes on their performance. Selections saved from these plots will be subjected to further tests including chipping quality, specific gravity, scab readings, internal quality, and external defects. For results of the 25-hill trial see Iowa table 1.

Iowa table 1.--25-hill potato test, Clear Lake, 1956.

Variety	Color	Maturity	Yield U.S.No.1 per acre	Total Solids	Scab		Remarks
					Area	Type	
			Bu.	Pct.			
La 1354	R	M	752	18.2	T	4	Lt. red, deep eyes
I 803-1	W	L	715	18.0	T	2	Flat
B 3319-30	W	ML	705	17.1	T	2	Stem end rot
I 1077-W 28-5	W	ML	680	17.7	2	2	Rough
B 922-12	W	ME	667	19.7	T	3	Poor shape
La. 1859	R	ME	623	16.7	0	0	Very rough
I 1110-10	W	L	617	17.7	1	3	Smooth, flat
ND 457-1-10	W	ME	608	16.5	1	3	Nice shape
I 1106-5	W	L	592	17.7	1	1	Very nice
I 1129-4	W	L	586	16.5	T	1	Somewhat flat
I 1089-W 11	W	L	560	15.8	1	2	Unattractive
B 3194-Ia.1	W	ML	495	17.1	1	4	Sl. russet
I 1049-3	R	L	492	19.2	T	2	Internal Red
I 913-2	W	M	460	16.7	T	2	Somewhat flat
B 3124-Ia.3	W	L	458	18.0	2	1	Fair
I 913-3	W	M	450	17.3	T	1	Fair
I 1027-18	R	ML	436	16.7	T	2	Fair shape
B 579-3	W	L	436	17.3	2	4	Sl. russet
I 1157-2	W	ME	435	18.2	2	1	Very nice
Teton	W	ML	425	15.6	3	2	Rough
I 1155-2	W	M	420	19.0	0	0	Unattractive
I 1015-4	W	L	417	15.4	1	1	Dull skin
CS 12240	W	L	399	17.7	T	1	Sl. russet
I 1123-1	W	M	383	16.2	2	1	Sl. russet
Delus	W	L	382	19.2	T	4	Eyes deep
Menominee	W	L	380	17.5	1	3	Deep eyes
I 1193-1	W	ME	355	18.0	1	2	Fair
I 1034-5	W	ME	340	16.0	1	1	Russet, smooth

continued

Iowa table 1.--continued.

Variety	Color	Maturity	Yield U.S.No.1 per acre	Total Solids	Scab		Remarks
					Area	Type	
I 1019-7	W	L	338	17.1	T	1	Rough, deep eyes
I 1015-2	W	L	338	13.9	T	1	Deep eyes
I 1157-8	W	M	337	18.2	T	2	Smooth
A 223-66	W	L	330	16.0	T	3	Pointed, rough
I 1157-6	W	M	320	18.0	1	4	Badly scabbed
B 2102-11	R	L	318	18.2	O	0	Lt. red
X 26-8	R	L	318	15.8	1	2	Lt. red
Merrimac	W	L	318	19.7	T	1	Very deep eyes
Saco	W	L	316	16.5	T	4	Extremely rough
I 1109-14	W	ML	312	16.9	2	3	Flat
BE 2336-2	W	L	304	17.1	T	1	Attractive
B 2162-36	R	M	298	19.2	T	1	Lt. Red Color
I 1107-1	W	L	296	17.5	3	1	Discard
X 927-3	W	L	289	18.2	1	4	Breeding use only
I 1084-1	R	ME	285	17.1	2	1	Smooth
B 2759-5	W	L	283	19.2	1	3	Deep eyes
I 781-7	W	L	275	19.9	T	2	Smooth
I 1107-3	W	ML	271	16.7	1	1	Dull skin
A 168-4	Rus	ME	269	17.5	O	0	Heavy russet
B 605-10	W	ME	256	16.9	1	1	-
41956	W	ML	256	17.5	1	4	Breeding only
B 2368-4	R	L	241	15.8	1	2	Very rough
A 223-18	R	L	237	18.6	1	1	Enfolded ends
Ac 25680	W	L	237	19.7	T	3	Rough
Early Gem	W	M	236	15.2	O	0	-
Boone	W	ME	214	14.8	1	2	Smooth
1911-2	W	ME	195	17.7	T	1	Some pointed
B 926-9	W	L	190	15.8	T	3	Sl. russet
B 3131-8	R	L	179	16.7	1	1	Very rough
I 947-W 18	R	L	169	16.0	O	0	Harvest-cracked
B 922-6	W	ME	153	15.4	T	2	Smooth
I 1108-5	W	L	137	15.8	T	1	Fair
A 1-10	W	M	121	16.0	1	4	-
A 129-1	W	ML	120	17.7	O	0	Pointed
I 874-2	W	ML	113	17.5	T	2	Sl. russet
I 1106-4	W	ML	111	18.8	1	1	Smooth
A 224-9	R	L	105	14.3	3	3	-
A 5-11	W	L	100	14.5	2	4	Scabby
I 1058-2	W	L	85	15.8	1	2	Smooth
B 3099-5	Rus	L	85	14.1	O	0	Heavy russet
A 116-113	Rus	L	48	16.5	2	1	Heavy russet
A 223-56	R	L	32	17.3	3	2	-

Increase Plots. Isolation plots were planted at Northwood, N. Dak., under the able supervision of Dr. W. G. Hoyman, who cultivates, sprays, and rogues these plots for virus diseases. Every tuber planted at Northwood is indexed in our greenhouses at Ames, and all are planted in tuber units. An extremely small number of units was rogued there this year. This is encouraging since spindle tuber has been a serious disease in past years. Apparently, this disease is gradually being eradicated. A total of 390 named varieties and selections were increased at Northwood this year.

Yield Trials. The Iowa yield trial included 22 entries of advanced seedlings, and named varieties. These trials were planted in a randomized block and were replicated 4 times. Each plot consisted of 25 hills.

This yield trial we learned was planted on very non-uniform soil. As a consequence, the results are biased depending on the locations of the plots within the test. Therefore the results in Iowa table 2 must be interpreted as only indicative.

Iowa table 2.--Iowa potato yield trials.

Variety	Color	Maturity	Yield U.S.No,1 (over 1 7/8")	Total solids	Scab		Growth cracks	Second growth	Hollow heart
			Bu.		Area	Type			
				Pct.			Pct.	Pct.	Pct.
Red LaSoda	R	L	504	15.7	T	4	18	12	2
Cobbler	W	M	461	18.0	T	4	0	4	26
I 911-7	W	L	412	20.5	3	2	2	0	0
I 1073-1	W	ML	380	17.1	1	2	0	0	0
Sebago	W	L	376	16.9	3	2	0	0	10
I 912-6	W	L	364	19.0	2	3	0	8	0
Cherokee	W	L	349	18.3	2	1	10	2	4
B 2068-23	W	L	333	16.3	3	2	0	4	4
La 1859	R	ML	322	17.5	2	2	2	0	0
Rushmore	Rus	ML	311	16.7	T	4	0	6	0
Katahdin	W	L	307	17.3	T	4	0	0	6
I 1037-1	W	ML	301	17.2	T	3	0	0	0
I 8140-1	R	L	289	20.1	T	1	0	0	0
Triumph	R	M	263	15.8	T	3	24	8	2
I 8168-1	W	ML	256	16.6	2	2	2	0	2
I 1107-3	W	L	242	18.6	2	2	0	0	12
I 915-4	W	L	239	16.8	2	2	2	0	0
Tawa	W	ME	227	17.5	T	3	4	0	0
Kennebec	W	L	227	16.1	T	4	0	0	2
Red Pontiac	R	L	223	15.0	T	4	8	0	2
I 957-1	R	ML	203	17.5	2	3	0	0	8
I 901-3	W	E	63	18.2	T	2	14	2	0
L.S.D. .91			222						
.05			167						

Leaf Roll and other disease screening. Over 6,000 seedlings which were placed in leaf roll cages in 1955 are being grown in isolation on the Horticulture Farm at Ames. About 99.9% of these showed definite leaf roll symptoms and were eliminated. Twenty-six selections were made which showed no symptoms. It is hoped that some of these may be useful in future breeding or even to release as a variety. No additional material was placed in leaf roll cages this year, since we are hoping to find even more efficient means of screening for leaf roll resistance.

A late blight and virus X chamber is now being planned and a 1-ton air conditioner has already been purchased. It will be very gratifying to have more adequate and less cumbersome facilities for screening for disease resistance.

Single-Hill Plots. About 30,000 single-hill plots were grown this year at Clear Lake. These have made phenomenal growth and they completely covered the rows on August 1. These seedlings were obtained as follows:

<u>Cooperator</u>	<u>No. of progenies</u>	<u>Est. No. of seedlings</u>
W. G. Hoyman, N. Dak.	7	300
J. C. Miller, La.	15	1500
W. C. Edmundson, Colo.	41	5000
T. P. Dykstra, La.	11	800
R. V. Akeley, U. S. D. A.	13	2000
John McLean, Idaho	36	3000
Robert Johansen, N. Dak.	34	3000

The rest of the seedlings were grown at Ames as part of the regular breeding program. From this large population, we obtained 147 selections. The plots at Clear Lake are effective for screening for scab resistance, and only seedlings which show no evidence of scab will be retained.

A New Project Added. Starting July 1, 1956, a new project was added to our program, entitled "Inbreeding and Heterosis in Potatoes" and goes under the Iowa State Experiment Station Project Number 1306 with a yearly budget of \$200. The primary objective of this new project is to experiment with new methods of breeding in potatoes, with special emphasis on attempts to adapt the newer breeding methods used with corn and onions to potatoes. Essentially the only breeding method available to potato breeders is one of making crosses in an extremely heterozygous population, and then making selections from an overwhelming large population ending up with a small number of selections for all the effort. This method is inefficient and anything to improve methods would be a big advance. This year 41 clones were simultaneously inbred and crossed to 6 tester lines. A program of progeny testing and selection will be following to attempt to obtain lines homozygous for high general combining ability. When such inbred lines are found, they will be improved by adding additional characters such as disease resistance. These latter characters are qualitatively inherited. This work will be done cooperatively with Dr. R. L. Plaisted at Cornell University.

North Central Regional Trials. This year Ohio joined our group to actively participate in the 1956 trials. Therefore, these trials were conducted by 9 States: Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, and Wisconsin. There were 14 entries at each location. This year we had 2 seedlings entered from the Iowa breeding program, I 911-2 and I 961-1, the former being put into the trials by Indiana. Report of the Iowa trial is summarized elsewhere.

Chipping Tests. In cooperation with the Hiland Potato Chip Company at Des Moines 43 clones were tested for chipping qualities. The resulting chips were judged for quality by a panel of 7 judges, as shown in Iowa table 3.

Iowa table 3.--Potato chipping tests, conducted at Hiland Potato Chip Co. March 19 and 20, 1956.

Variety	Average ratings 7 judges ^{1/}	Specific gravity	Total solids	Variety	Average ratings 7 judges ^{1/}	Specific gravity	Total solids
Kennebec	1.0	61	15.6	Wis. Sl-55	2.1	60	15.4
I 912-6	1.1	59	15.2	Ia. 1084-1	2.3	71	17.7
I 803-3	1.1	60	15.4	Rushmore	2.3	61	15.6
I 781-7	1.1	82	20.1	Cobbler	2.3	72	18.0
Wis. 0103.51	1.1	66	16.7	I 1120-6	2.4	63	16.0
I 1123-1	1.3	52	13.7	B 3131-8	2.4	64	16.2
B 2847-Ia. 5	1.3	50	13.3	I 1129-4	2.4	74	18.4
N.D. 2910-1R	1.4	67	16.9	Antigo	2.4	54	14.1
Osage	1.7	68	17.1	I 1015-2	2.5	95	22.9
I 957-1	1.7	65	16.5	Red Pontiac	2.7	55	14.3
I 801-10	1.7	71	17.7	I 961-1	2.7	63	16.0
Cherokee	1.7	63	16.0	Mich. 1363	3.0	65	16.5
I 1111-10	1.8	69	17.3	I 1165-14	3.0	80	19.7
Minn. 119	1.8	60	15.4	Wash. 137-5	3.1	59	15.2
I 1133-1	1.9	70	17.5	I 913-2	3.3	57	14.8
I 1155-2	2.0	75	18.6	B 3170-Ia.1	3.5	61	15.6
I 8140-1	2.0	69	17.3	I 1034-5	3.5	65	16.5
Ia. 1354	2.0	69	17.3	Triumph	4.0	57	14.8
Ia. 1089-W138	2.0	64	16.2	I 1073-1	4.0	58	15.0
Ia. 1015-4	2.1	55	14.3	I 1058-2	4.0	66	16.7
B 3106-Ia.4	2.1	64	16.2	Minn. 32.45-180-47	4.0	61	15.6
				N.D. 457-1-16	4.0	62	15.8

^{1/} Judges were Mr. Ben Vance, Dr. Denisen, A. E. Schark, A. E. Kehr, Louise Alexander, R. L. Plaisted, and Dr. Lana

In addition, the same panel rated the best 5 samples in order of preference. In all cases only numbers appeared on the samples in order to prevent biased judgments. The summary of over-all placements are shown in table 4. The selection I 803-3 has been released as Tawa.

Iowa table 4.--Chipping tests. Points scored by varieties as rated by 7 judges.

Variety	Total points scored	Average color rating
Kennebec	31	1.0
I 803-3	23	1.1
I 781-7	11	1.1
I 1123-1	11	1.3
Wis. 013.51	8	1.1
B 2847-Ia.5	7	1.3
Osage	5	1.7
B 3106-Ia.4	4	2.1
I 912-6	3	1.1
I 801-10	2	1.7

Scores as follows: 1st place rating = 5
 2nd " " = 4
 3rd " " = 3
 4th " " = 2
 5th " " = 1

Release of I 803-3 as Tawa. The Horticultural Crops Research Branch of the United States Department of Agriculture, the Iowa Agricultural Experiment Station, and the Michigan Agricultural Experiment Station announce the release of a new variety of potato named Tawa.

Tawa was tested under the pedigree number Ia. 803-3. It is an early, high quality, smooth, white variety immune to latent mosaic (virus X) and resistant to scab, late blight and mild mosaic (virus A). It is a selection from a cross between U. S. D. A. seedlings B 595-76 and B 76-23. The female parent, B 595-76 is resistant to the common race of late blight, scab, verticillium wilt, and is immune to latent mosaic (virus X). The pollen parent is resistant to scab and the common race of late blight. The cross was made at Ames, Iowa, in 1948, and the seedling was grown in the greenhouse there. From a relatively small progeny of only 50 hills from this cross grown at Clear Lake, Iowa, in 1949 three were selected and subsequently two of these were discarded. In 1950 Ia. 803-3 was included in observation plots at Clear Lake, Iowa, and in seed increase plots at Northwood, N. Dak. At Clear Lake it was selected because of earliness, resistance to scab, and attractive appearance. Immunity to latent mosaic (virus X), resistance to mild mosaic (virus A) and resistance to late blight were established in greenhouse tests.

In yield trials at Clear Lake, Iowa, in 1952, Tawa yielded 518 bushels per acre of U. S. No. 1 potatoes compared with 487 bushels for Irish Cobbler. Tawa graded 90.1 percent U. S. No. 1 while Irish Cobbler graded only 75.5 percent. The principal external defects in Tawa were 6.5 percent undersize and 1.3 percent growth cracks. This selection was also quite free from serious internal defects. Irish Cobbler had 18 percent hollowheart compared with 1 percent for Tawa and defects such as internal necrosis and vascular discoloration were

negligible. Under unusually hot, dry conditions at Clear Lake, Iowa, in 1955 Tawa did not outyield Irish Cobbler and it showed a marked tendency to scab, producing No. 3 type scab which was only slightly less severe than No. 4 type lesions observed on Irish Cobbler. In muckland trials in Allegan County, Mich., in 1955 Tawa produced 565 bushels per acre of U. S. No. 1 potatoes compared with 116 bushels for Irish Cobbler. Irish Cobbler yielded 20.4 percent U. S. No. 1 grade while Tawa yielded 83.4 percent.

While harvest cracking was not serious in most trials, a tendency to crack, noted in a few locations, indicates that this weakness is present and growers should be cautioned to follow harvesting practices which will minimize mechanical abuse.

Tawa is early in maturity. In 1952 at Clear Lake, Iowa, it was observed to mature as early as Irish Cobbler, but appeared to be slightly later than Irish Cobbler in 1953. At Northwood, N. Dak. in 1953 it matured as early as Red Warba. It is also equal to Irish Cobbler in cooking quality, having produced tubers with a specific gravity of 1.074 compared with 1.072 of Irish Cobbler in 1952. Tawa had a higher dry-matter content than Irish Cobbler in 4 out of 6 trials in Michigan in 1955. Chipping quality is good both at harvest and after storage and conditioning. In this respect it is superior to Irish Cobbler, but not quite as good as Russet Rural and Kennebec. In 1955 Tawa was included in trials at 6 locations in Michigan, and 8 locations in Wisconsin. It was also entered in the North Central Regional trials located in 7 States. In many of these locations Tawa was outstanding among early maturing varieties, particularly where scab was severe. Because of its cooking and chipping qualities, earliness, resistance to scab, late blight, virus X and virus A, it should find acceptance as a variety in areas where these characteristics are important.

KENTUCKY
Clyde Singletary

The potato yields of 9 varieties, presented in Kentucky table 1, in 1956 were not as high as expected. This was unusual considering the amount of rainfall during the spring. Because of frequent rains throughout the season the weeds were hard to control. This may have accounted for poorer yields this year.

The varieties are rated according to the appeal as well as what the staff thought of the cooking quality. Considering earliness, Irish Cobbler would rank next to Kennebec. Seedling B-2368-4 should be tested again because of its good yield.

POTATO YIELD TRIAL - 1956

<u>Variety</u>	<u>Bu/Acre No. 1</u>	<u>Bu/Acre No. 2</u>	<u>Total</u>
B-607-56	290	108	398
Cobbler	324	78	402
Kennebec	408	92	498
Red Pontiac	425	124	549
Boone	346	108	454
Saco	305	113	418
Pungo	369	117	486
B-2368-4	383	142	525
B-605-10	314	123	437

LOUISIANA

Julian C. Miller and John R. King^{1/}

The Louisiana Irish potato development program continued in 1956 towards its objective of the production of early, red-colored, blight- and scab-resistant selections of high quality and yield, together with the development of superior quality and yield, disease-resistant, white-tubered selections. The program concentrated, as in the past, on breeding, seedling selection, yield trials, storage tests, physiological studies, and tuber processing tests.

The set of seedballs was particularly high on such female parents as Seedlings 22-153, 22-194, 92-167 and 91-143, and either very low or not at all on such varieties as Red LaSoda, LaSoda, Triumph, Sebago, Katahdin, and Burbank. This situation is in contrast to the sets of similar crosses used in 1955 when the weather during the pollination crosses was supposedly unfavorable to seedball set. Stored pollen is now used routinely in the potato-breeding program.

Around 5,000 seedlings from 30 parental combinations and 2 selfs were grown in the greenhouse late in 1955, together with a similar number of seedlings grown in relation to disease-resistance potentialities. From these seedlings, 1,328 individual tubers were selected for planting in South Dakota in May of this year.

Test on Resistance to Common Scab

A test on the resistance to common scab (*Streptomyces scabies*) of all of the seedlings in the Irish potato development project was carried out in the spring of 1956 at the Plaquemines Parish Experiment Station at Diamond, La. The results of this test are shown in La. table 1. All of the seedlings not having other desired characters and susceptible to scab were discarded. The seedlings listed in table 1 either showed resistance or were saved for other purposes. Large differences occurred among the entries as to susceptibility to the organism. The following selections showed some resistance to scab: 92-23, 91-78, 91-143, 92-167, 12-92, 12-94, 22-153, 22-194, 21-367, 42-23, 42-45, 41-50, S.B. 176, S.D. 4112 and 1859.

Studies on Quality

La tables 2 and 3 show the analyses as to recoverable chips, reducing sugars, specific gravity, color, flavor, and texture of samples of standard varieties and advanced seedlings collected at Baton Rouge, and at the Plaquemines Parish Experiment Station at Diamond, La. Of the seedlings tested for chipping and other qualities, as can be observed from the tables, 91-143, 91-78, Rushmore, LaSalle, and 1859 were given a rating of excellent for flavor.

*

^{1/} In cooperation with T. P. Dykstra, of the United States Department of Agriculture and the National Potato-Breeding Program.

La. table 1.--Resistance of seedlings and check varieties to scab in 1956. Plaquemines Parish Experiment Station, Diamond, La.

Variety or seedling	Depth of lesions*	Surface covered with scab	Remarks
		Pct.	
LaSoda	3	10	None
Red LaSoda	3	10	"
Triumph	3	10	"
Rushmore	3	10	"
LaSalle	4	30	"
Cherokee	Trace	Trace	"
DeSoto	3	10	"
1859	2	Trace	"
82-94	4	50	"
91-10	1	30	Powdery scab
92-23	Trace	Trace	Very good
91-78	2	"	None
91-143	Trace	"	"
92-167	2	10	"
12-91	2	Trace	"
12-92	1	"	Good shape & color
12-94	1	"	None
22-153	1	"	Good
22-194	1	"	None
21-367	1	10	"
31-30	2	30	"
32-90	2	10	"
42-23	1	Trace	Good
41-35	1	10	None
42-45	2	Trace	Very good
41-50	1	10	" "
41-51	2	10	None
41-60	2	30	"
S.B. 005	1	10	White
S.B. 116	2	Trace	White skin
S.B. 176	1	10	White
S.B. 553	3	50	" "
S.B. 776	3	10	Dirty pink skin
G-4	3	10	
G-5	3	10	
G-7	2	Trace	Red
N.D. 3954	2	10	White
S.D. 3769	2	10	"
S.D. 4112	1	10	"
606-37	3	10	"
606-67 (Saco)	2	10	"

* Rating from 1 to 5. 1, very shallow lesions, and 5, very deep lesions.
Date of planting, January 19, 1956; date of harvesting, April 20, 1956.

La. table 2.--Analysis of Irish potato samples collected at Baton Rouge on May 24, 1956.

Variety or seedling	Recover- able chips	Chipping Quality				
		Reducing sugar	Total Solids	Color	Flavor	Texture
	Pct.	Pct.	Pct.			
LaSoda	27.0	.042	16.5	4	Good	Medium
Red LaSoda	28.8	.042	16.3	5	Very good	"
Triumph	27.0	.05	16.5	3	Good	"
Katahdin	29.8	.05	16.9	5	Very "	"
LaSalle	31.3	.05	17.7	5	" "	"
Rushmore	29.5	.03	18.2	6	Excellent	"
82-94	29.0	.06	17.5	4	Good	"
91-10	29.8	.057	15.6	2	Slightly burnt	Fine
91-78	30.5	.05	18.2	6	Excellent	Medium
91-143	29.5	.045	18.6	5	"	"
21-367	28.5	.055	17.2	4	Good	"
22-195	28.3	.08	16.0	2	Slightly Burnt	Fine
32-92	29.3	.03	16.7	5	Very good	Medium
1859	31.8	.042	18.4	6	Excellent	"

La. table 3.--Analysis of Irish potato samples collected at Plaquemines Parish Experiment Station, Diamond, La., 1956

Variety or seedling	Recover- able chips	<u>Quality Ratings</u>			Reducing sugars	Total solids
		Color	Flavor	Texture		
	Pct.				Pct.	Pct.
30-31	27.3	4	G	G(med.)	.030	18.4
22-195	29.8	4	G	"	.067	19.4
LaSalle	32.5	6	Ex	Ex(med.)	.030	21.2
LaSoda	29.0	4	VG	G(med)	.035	19.1
Triumph	30.5	5	VG	Ex(med)	.042	19.7
12-94	30.5	4	VG	G(med)	.030	18.4
91-78	32.0	6	Ex	Ex(med)	.025	20.8
Rushmore	31.0	6	VG	"	.025	21.0
12-92	29.5	4	VG	VG(med)	.067	18.4
91-10	31.5	5	VG	G(med)	.042	18.6
32-92	30.0	5	VG	Ex(med)	.025	20.8
Cherokee	27.5	4	VG	G(med)	.025	19.9
91-143	31.8	6	Ex	Ex(med)	.025	21.0
82-94	30.8	5	VG	"	.050	20.8
Red LaSoda	29.5	4	VG	G(med)	.050	19.4
21-367	30.0	5	VG	VG(med)	.037	19.4

G, good; VG, very good; Ex, excellent.

Selection Trials

Of the previous year's seedlings tested in South Dakota, 232 were saved for further evaluation. Of the 73, 1955, seedlings tested, only 18 were saved for further trial, and 6 of the 1954 and 3 of the 1953 seedlings were saved, and these older seedlings, along with standard varieties were placed in advanced yield tests as shown in La. table 4.

La. table 4.--Yield data on varieties and seedlings tested in Louisiana in 1956.

Variety or selection	Diamond Pl.1/10 Har.4/20	Donald- sonville Pl.2/23 Har.5/23	New Roads Pl.1/27 Har.5/8	Chase Pl.3/5 Har.6/12	Average
LaSoda ^{1/}	229.3	219.0	184.6	270.0	225.7
Red LaSoda ^{2/}	179.2	176.6	138.9	182.8	169.4
Triumph ^{1/}	182.6	113.5	68.5		121.5
LaSalle	83.5	112.0	62.7		86.1
Cherokee	114.6				114.6
82-94	148.3	171.3	75.3	65.6	115.1
91-10	113.2	69.0	109.4	150.3	110.5
91-78	177.7	192.2	132.1		167.3
91-143	208.7	168.0	143.5		173.4
12-92	105.8				105.8
12-94	91.2				91.2
22-195	132.9	106.2	94.4	92.3	106.5
21-367	105.1	43.6	149.3		99.3
31-30	77.0				77.0
32-90	96.0				96.0
32-92		107.9	56.4		82.2
1859		286.5			286.5
Katahdin ^{3/}		173.5	203.8	146.3	174.5
Sebago ^{3/}			201.9	105.5	153.7
LaSoda			220.9		220.9
Red LaSoda ^{4/}			281.7		281.7
Triumph ^{4/}			100.7		100.7
Nebr. 2644-1 ^{4/}			145.0		145.0
L.S.D. 5%	20.5				
1%	27.4				

Source of seed:

- ^{1/} E. A. Fletcher, Garden City, S. Dak.
- ^{2/} Charles S. Blackman, Clark, S. Dak.
- ^{3/} Starks Farms, Inc., Starks, Wis.
- ^{4/} Nebraska Certified Potatoes, Alliance, Nebr.

It will be noted that the source of seed, particularly for the LaSodas, played a big part in the yielding ability. This was probably due primarily to rest period differences in the different lots of seed and to some extent to disease, as some lots had more disease present than others. Red LaSoda from Nebraska outyielded other varieties and other sources of the same variety.

Of the numbered seedlings in the test, white seedling 91-1143 was probably the best. It is resistant to scab and so far has shown resistance to blight. The new pink seedling 1859 also produced a very high yield. However, it has a pink skin. Red mutations and other selections developed from this latter seedling are now in test at this station. Another high-quality seedling was 91-78, which is early and an excellent potato for chipping.

In La. table 5 are shown the yields of LaSoda and Red LaSoda compared with yields of other standard varieties over a 5-year period (1952 through 1956) at Baton Rouge. As will be seen from this table the 2 LaSodas continued to outyield other older standard varieties. The Red LaSoda, when absolutely free of disease, so far has outyielded other varieties and seedlings. However, for the last few years one of our sources of seed has been contaminated with virus disease, which has reduced the yield somewhat. Attention is called to the yield for 1953, when a source of seed was available that was free of disease. It will be noted that the Red LaSoda produced the highest yield.

La. table 5.--Yields of LaSoda and Red LaSoda compared with yields of other standard varieties over a 5-year period at Baton Rouge, La.

Variety or selection	Year and yield					Average
	1952 Bu.	1953 Bu.	1954 Bu.	1955 Bu.	1956 Bu.	
LaSoda	352.4	297.8	188.4	201.5	220.9	252.2
Red LaSoda		311.9	203.3	110.3	281.7	226.8
Triumph	241.4	251.5	165.7	81.2	100.7	168.1
Katahdin			216.1	121.6	203.8	180.5
Sebago			177.0	29.5	201.9	136.1
Rushmore		166.2	160.5	78.7	79.1	121.1

Blank spaces indicate that a seedling or variety was not in yield tests during that year.

In regard to the Rushmore for the years 1955 and 1956 the same could be said regarding disease-free seed. There has been too much disease in the seed source of this variety for normal yields. The yields of 1953 and 1954 would be closer to normal for this variety. However, the Rushmore is not a top-yielding variety under southern conditions. It does give a very satisfactory yield under northern conditions and is a very good baker. It is oblong in shape and about 10 days to 2 weeks earlier than the Burbank. Since it is earlier than the other sources of oblong potatoes and has good cooking quality, this variety is recommended for the northern tier of States in particular. When planted in the South it should have irrigation where the soil moisture can be kept at optimum for best growth. This variety will be released officially this year.

MAINE

Reiner Bonde, Robert Akeley, and Donald Merriam

Development of Commercially Desirable Ring-Rot-Resistant Varieties

Studies were continued in 1956 in an attempt to develop commercially desirable potato varieties that are highly resistant to or immune from bacterial ring rot. The work was done as part of the National Potato-Breeding Program.

Approximately 380 selected commercially desirable seedlings from ring-rot-resistant parents were tested in the field for their susceptibility to ring-rot infection. Freshly cut seed tubers from the different varieties and selections were severely inoculated by being dipped in a virulent culture of the bacteria. The inoculated seedpieces were planted in the field and observations were made at regular intervals for extent of disease infection.

Bonde table 1 gives the pedigree, parentage, and percentage ring-rot-infected seedlings that occurred in the different progenies. The data show that the progenies of some crosses produce relatively high percentages of resistant seedlings. Many of these seedlings are not only highly resistant to ring rot, but possess certain desirable marketing qualities. Most of the crosses were designed to combine ring-rot resistance with resistance to one or more of the other diseases, including late blight, leaf roll, mosaic, and scab.

Bonde table 2 gives the percentage ring-rot-infected plants that developed in the parents of the different progenies when inoculated. Merri-mack and seedlings B 355-24, B 355-44, and B 3097-82 were the most resistant and did not become infected. Saranac and Teton, which also have been used extensively in the breeding program, developed some infected plants as a result of the inoculations. The study will be continued in 1957 in an attempt to produce a ring-rot-resistant or immune variety that possesses good marketing qualities and is adapted to the conditions of Arcostook County, Maine.

Comparison of Yield Rates of Ring-Rot-Resistant Seedlings and Commercial Varieties

Eight of the most desirable ring-rot-resistant seedlings and 4 commercial varieties were compared in 1956 for yielding ability and other desirable qualities.

The potatoes were planted May 20 and were harvested September 17 which permitted a long growing season. Insect infestation and late blight were controlled by weekly applications of Nabam and DDT oil emulsion spray mixture.

Bonde table 1.--Percentage of inoculated seedlings in progenies infected with ring rot.

Pedigree	Parentage	Number tested	Percentage of progeny in each class of infection 1/					
			0	1	2	3	4	5
B 3832	B 294-38 x B 3139-24	21	23.8	4.7	4.7	4.7	14.3	47.6
B 3845	B 2359-84 x B 766-55	4	25.0	50.0	.0	.0	.0	25.0
B 3853	B 991-14 x Saranac	8	12.5	12.5	12.5	.0	25.0	37.5
B 3854	B 991-14 x Teton	10	10.0	10.0	10.0	33.3	.0	40.0
B 3855	B 2935-7 x B 3021-3	6	33.3		50.0	.0	16.7	.0
B 3856	B 3021-3 x Teton	9	33.3	55.6	.0	.0	.0	11.1
B 3857	Saranac x B 929-32	20	10.0	40.0	5.0	.0	25.0	20.0
B 3858	B 355-44 x B 2919-1	7	57.1	14.3	.0	14.3	.0	14.3
B 3859	B 355-24 x B 3167-28	16	12.5	6.3	12.5	18.8	18.8	31.3
B 3860	B 607-56 x B 2968-7	40	5.0	7.5	15.0	7.5	7.5	57.5
B 3861	B 931-2 x 96-56	4	.0	.0	25.0	25.0	.0	50.0
B 3862	B 3160-12 x B 355-24	16	.0	12.5	25.0	12.5	18.8	31.3
B 3864	3 XE-1 x B 355-24	11	.0	.0	27.3	18.2	27.3	27.3
B 3868	3VW-9 x B 355-24	7	.0	.0	.0	28.6	14.3	57.1
B 3869	B 355-35 x Teton	9	33.3	22.2	11.1	11.1	11.1	11.1
B 3870	Katahdin x B 355-24	1	.0	.0	.0	.0	.0	100.0
B 3872	Katahdin x B 355-24	21	28.6	14.3	19.0	19.0	4.8	14.3
B 3873	B 766-55 x Katahdin	13	23.1	30.8	23.1	7.7	7.7	7.7
B 3874	B 766-55 x Teton	19	36.8	15.8	10.5	10.5	21.1	5.3
B 3876	B 3097-82 x B 3139-24	33	54.5	36.4	3.0	.0	.0	6.1
B 3879	Ac 25953 x B 355-44	4	.0	50.0	25.0	.0	25.0	.0
B 3900	B 2331-5 x B 3139-24	5	20.0	.0	40.0	20.0	.0	20.0
B 3909	Ontario x B 3139-24	4	.0	.0	.0	50.0	.0	50.0
B 3922	792-88 x B 3139-24	18	27.8	11.1	5.6	16.7	16.7	22.2
B 3944	1673x228(182)xMerrimack	36	19.4	16.7	8.3	16.7	13.9	25.0
B 3945	1673x228(85)x Merrimack	14	7.0	7.1	28.6	7.1	21.4	28.6
B 4456	Saranac selfed	2	.0	.0	50.0	50.0	.0	.0
B 4457	Teton selfed	12	25.0	16.7	25.0		25.0	8.3
B 3957	Ac 25953 x Teton	6	33.3	.0	16.6	50.0	.0	.0
B 3969	HIM-1 x Saranac	1	.0	.0	.0	.0	.0	100.0
B 3976	3VW-9 x B 355-24	3	.0	.0	.0	.0	33.3	66.6
Katahdin controls	540568 x 24642	400	.0	.0	.0	7.0	29.0	64.0

1/ Based on 5 inoculated seedpieces for each seedling.

Bonde table 2.--Percentage of inoculated plants infected. Parents used in 1956 breeding program.

Variety or seedling	Percentage of plants infected ^{1/}
Katahdin	100
Merrimack	0
Ontario	100
Russet Burbank	100
Saranac	20
Teton	20
B 294-38	100
B 355-24	0
B 355-44	0
B 792-83	60
B 926-32	100
B 991-14	100
B 2331-5	80
A 2359-84	100
B 2919-1	100
B 2962-6	100
B 2969-7	100
B 3097-82	0
3XE-1	60
3VW-9	80
3NC-9	80

^{1/} Based on 10 inoculated seedpieces for each variety or seedling.

Bonde table 3 lists the seedlings and varieties included in this test and the yields they produced.

All of the ring-rot-resistant varieties produced attractive marketable tubers in addition to desirable foliage characteristics. Green Mountain produced the largest yield. The yield, however, was not significantly larger than those produced by seedlings B 721-29, B 2854-1 and B 3141-3. The latter seedlings also yielded significantly more than Katahdin, the variety most widely grown in Maine. Merrimack, a new ring-rot-resistant variety developed as a result of the breeding program, produced the lowest yield rate in the test.

Bonde table 3.--Yields for 12 ring-rot-resistant seedlings.

Variety or pedigree	Parentage	Yield per acre ^{1/}	
		Bu.	Brl.
Green Mountain	Dunmore x Excelsior	289	793
B 721-29	Earlaine x Teton	286	787
Kennebec	B 127 x (X96-56)	275	757
B 2854-1	B 721-29 x Furore	269	740
B 3141-3	B 721-29 x Teton	264	726
B 2855-5	B 721-29 x B 355-44	256	703
Katahdin	S 40568 x S 24642	230	632
B 911-2	055 x Teton	229	624
B 991-14	B 355-24 x B 81-40	222	611
B 991-21	055 x Teton	216	593
B 2900-37	Ontario x B 355-44	212	583
Merrimack	X96-56 x Saranac	207	570
L.S.D. 5%		26	71
L.S.D. 1%		35	95

^{1/} Average of 5 replicated 1-row plots each 25 feet in length. Yields arranged in descending order and tested by Duncan's New Multiple Range Test. Yields bracketed together do not differ significantly at 5% level.

MAINE

Reiner Bonde, Geddes Simpson, Robert Akeley and Donald Merriam

Selection of Desirable Seedlings for the Leaf Roll Resistance Breeding Program

Studies are being conducted in Maine in an attempt to produce new potato varieties that are immune or highly resistant to leaf roll. This work has shown that the potato varieties vary greatly in susceptibility to this disease and that resistance may be increased by a breeding program.

Twenty-nine selected seedlings from resistant parents were compared in 1956 for leaf roll resistance in the field when artificially infested with viruliferous green peach aphids (*Myzus persicae* Sulz.). The seedlings and the commercial varieties Katahdin, Kennebec, and Green Mountain were planted in the field. Each plant of the seedlings and of the commercial varieties was infected with viruliferous aphids reared in the greenhouse on leaf-roll-infected Katahdins.

Data were obtained regarding the relative extent of aphid infestation on the seedlings and varieties, as well as the percentage of leaf roll infection that had occurred following infestation of the plants with the viruliferous aphids. The plots also were harvested and yields obtained.

Bonde table 4 gives the percentage of the plants with leaf roll, the average number of aphids per leaf, and yields for the inoculated seedlings and control varieties included in the experiment.

Bonde table 4.--Average percent leaf roll, number aphids per leaf, and yield for selected seedlings inoculated with viruliferous aphids^{1/} Katahdin, Kennebec, and Green Mountain included for comparison.

Pedigree	Parentage	Leaf	Aphids	Yield per acre ^{3/}	
		roll	per leaf ^{2/}		
		Pct.	No.	Brl.	Bu.
B 3388-19	B 784-53 x Katahdin	6	34	207	569
B 3393-41	B 2187-25 x B 24-58	8	24	178	489
B 24-58	Imperia x Earline	12	7	228	628
B 3490-18	B 2925-23 x B 24-58	24	11	213	587
B 3484-3	Ac.25830 x B 2429-92	60	8	178	489
B 3391-107	B 859-10 x B 24-58	62	19	180	495
B 3397-17	B 2113-9 x B 864-2	74	16	191	525
B 3559-134	B 859-10 x B 24-58	76	12	163	448
B 3391-46	B 859-10 x B 24-58	84	22	172	474
B 3389-3	B 784-53 x B 24-58	84	20	167	459
B 3490-8	B 2925-23 x B 24-58	84	68	170	466
B 3389-10	B 784-53 x B 24-58	90	37	149	407
B 3391-23	B 859-10 x B 24-58	90	7	182	500
B 2938-22	B 355-44 x B 522-33	100	21	127	349
B 2971-14	B 574-14 x B 872-70	100	10	160	441
B 3095-18	Houma x Triumph	100	25	204	561
B 3299-13	B 936-12 x Katahdin	100	45	152	418
B 3302-68	B 2113-9 x B 936-12	100	10	177	487
B 3388-25	B 784-53 x Katahdin	100	76	106	292
B 3390-29	B 859-10 x Katahdin	100	22	121	333
B 3391-2	B 859-10 x B 24-58	100	30	200	551
B 3391-115	B 859-10 x B 24-58	100	16	203	559
B 3392-9	B 2187-25 x Katahdin	100	9	74	202
B 3393-14	B 2187-25 x B 24-58	100	34	111	305
B 3400-1	B 24-58 x B 922-3	100	54	135	372
B 3490-1	B 2925-23 x B 24-58	100	65	155	425
B 3559-142	B 859-10 x B 24-58	100	14	214	589
B 3559-149	B 859-10 x B 24-58	100	44	182	502
B 3560-26	B 859-10 x B 784-53	100	24	146	402
Katahdin		100	45	144	397
Kennebec		100	41	203	559
Green Mountain		100	26	218	600
L.S.D. 5%			3	29	79
1%			4	37	102

1/ Each individual plant inoculated with approximately 5 viruliferous aphids (*Myzus persicae*) when from 4 to 6 inches in height.

2/ Average of 5 replicated 25-foot plots for each seedling and variety.

3/ Average of 5 compound leaves per plant from each seedling variety.

The data show that there was a great difference in the susceptibility to leaf roll infection. The disease infection for the 29 selected seedlings varied from 6 to 100 percent. Of special interest are 4 seedlings with relatively low infection. They are B 3388-19, B 3393-41, B 24-58, and B 3490-18, with 6, 8, 12, and 24 percent leaf roll, respectively.

Nine other seedlings developed 60 to 90 percent leaf roll infection and apparently possess considerable resistance. The remaining selected seedlings were 100 percent infected and have no leaf roll resistance according to this test.

Katahdin, Kennebec, and Green Mountain, included as controls, also were highly susceptible, and all of the plants developed symptoms of the disease.

The data in table 4 show that the seedlings varied greatly in respect to aphid infestation. Seedling B 24-58 had the smallest number of aphids -- 6.6 per leaf. The data also indicate that resistance to aphid infestation is inherited, and a number of seedlings with this variety as one parent also harbored relatively few aphids. Resistance to aphid feeding, however, was not always associated with a corresponding reduction in leaf roll infection.

Table 4, columns 6 and 7, gives the yields produced. Seedling B 24-58, one of the seedlings used extensively as a parent in the leaf roll breeding program, produced the highest yield and about 10 barrels or 28 bushels per acre more than Green Mountain. Thirteen of the resistant seedlings yielded more than Katahdin, the standard variety now being grown in Maine, and 4 yielded as much or more than Kennebec, one of the best yielding varieties.

MAINE

Charles E. Cunningham, R. V. Akeley, and A. E. Schark

Variety yield trials were conducted in Maine in 1956 at Presque Isle, Fort Kent, Patten and Exeter. The parentage and main characters of the varieties and seedlings tested are given in Cunningham table 1. The results for yield and total solids are given in Cunningham table 2.

Cunningham table 1.--Parentage and characters of varieties and seedlings in yield trials, Maine, 1956.

Variety	Parentage	Matu- rity	Skin color	Main characters for disease resistance
Boone	TI-5 x B 231-3	LL	W	Lb
Cherokee	96-56 x 528-170	M	W	Lb, sc, virus A
Delus	Mohawk x 96-56	M	W	Lb, high solids
Katahdin	40568 x 24642	L	W	Lr, net nec, virus A
Kennebec	B 127 x 96-56	L	W	Lb, net nec, virus A
Merrimack	96-56 x Saranac	L	W	Lb, net nec, rr, high sol.
Plymouth	Mohawk x 96-56	M	W	Lb, net nec, sc.
Pungo	96-44 x 528-170	M	W	Lb, yield, high solids
Russet Burbank	-----	L	Rus	High solids
Saco	41956 x 96-56	L	W	Lb, viruses X, A, S, n.nec.
B 73-3	Mohawk x "	L	W	Lb,
B 595-76	41956 x Cherokee	M	W	Lb, sc, viruses X,A,vw, net nec.
B 605-10	Pungo x 96-56	E	W	Lb.
B 920-7	B 401-3 x B 355-24	E	W	Lb, sc.
B 1339-12	B 514-14 selfed	L	W	Lr.
B 2368-4	Pontiac x B 400-1	L	Red	Sc, yield
B 2938-22	B 355-44 x B 522-33	M	W	Lr.
B 2971-14	B 574-14 x B 872-76	E	W	Lr.
B 3095-18	Houma x Triumf	E	W	Lr.
B 3299-13	B 936-12 x Katahdin	M	W	Lr.
B 3391-2	B 859-10 x B 24-58	M	W	Lr.
B 3397-17	B 2113-9 x B 864-2	L	W	Lr.
B 3400-1	B 24-58 x B 922-3	E	W	Lr.

Saco, Boone and Kennebec yielded well at all locations. Seedlings B 595-76, B 3391-2, B 3397-17 and B 1339-12 were outstanding in total solids content. All had over 20 percent total solids when grown at Presque Isle, where all were included in the trials. The percent total solids of each of these seedlings was significantly higher than that of the named varieties with the exceptions of Saco, Pungo and Delus which scored the highest of any entry in the trials. The yield of these seedlings compared favorably with the named varieties.

Cunningham table 2.--Yield of tubers over $1\frac{1}{2}$ inches in bushels per acre and percentage total solids, 4 locations in Maine, 1956.

Variety	Presque Isle		Fort Kent		Patten		Exeter		Mean	
	Over $1\frac{1}{2}$ "	Total solids	Over $1\frac{1}{2}$ "	Total solids	Over $1\frac{1}{2}$ "	Total solids	Over $1\frac{1}{2}$ "	Total solids	Over $1\frac{1}{2}$ "	Total solids
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Saco	692	20.2	702	15.3	792	18.4	644	19.2	708	18.3
B 2368-4	744	17.9	542	14.1	873	17.4	662	16.7	705	16.5
Boone	648	16.9	625	13.8	698	16.9	671	17.2	660	16.2
Kennebec	659	18.9	597	15.3	726	17.7	584	17.9	641	17.4
Plymouth	657	18.4	620	15.5	708	17.7	526	17.2	628	17.2
B 605-10	631	18.9	-	-	721	17.4	482	17.9	611	18.1
Katahdin	616	18.9	581	15.2	671	17.4	550	17.7	604	17.3
Cherokee	649	19.2	543	15.7	-	-	-	-	596	17.4
B 595-76	658	20.2	440	15.7	613	19.2	593	19.0	576	18.5
B 3095-18	612	18.9	509	15.7	656	17.4	476	17.4	563	17.4
Delus	566	21.2	488	17.7	646	19.7	546	20.2	562	19.7
B 3299-13	566	18.9	494	15.5	648	17.4	499	17.9	552	17.7
Merrimack	517	19.4	468	16.0	526	18.9	520	19.7	508	18.5
Russet Burbank	522	19.2	448	16.7	555	19.2	470	19.0	499	18.5
B 2971-14	522	19.7	383	17.9	502	19.4	332	19.7	435	19.2
Pungo	709	19.9								
B 3397-17	631	20.2								
B 3391-2	621	20.7								
B 73-3	614	19.9								
B 1339-12	583	20.2								
B 2938-22	572	18.4								
B 3400-1	531	17.2								
B 920-7	488	18.4								
L.S.D. at .05	58	0.7	81	0.8	82	0.8	57	0.6		

MAINE

G. W. Simpson, Reiner Bonde, R. V. Akeley, and Donald Merriam

Leafroll-Resistant Seedlings

Green peach aphids, held on leafroll Katahdin plants for a week, were transferred to field growing seedlings. The aphids were allowed to develop on the seedlings for about one month when the infestation was reduced by means of parathion. In 1956, 5,393 tubers from the greenhouse at Beltsville, Md., were planted on Aroostook Farm and tested for leafroll resistance for the first time. Twenty-two crosses and one selfed line were represented. In addition to the new seedlings and those saved from previous introductions for retesting, 929 selections representing 40 crosses and 4 selfed lines and 25 parents were included in the 1956 test.

The seedlings were read for current-season leafroll symptoms in August and any showing leafroll was eliminated; the others were saved for further testing. On this basis, 106 hills (2 percent of the 5,358 seedlings growing) were saved for retesting.

Healthy tubers of Green Mountain, Katahdin, Chippewa, and Houma were planted systematically among the seedlings and were infested at the same time as the seedlings were infested with green peach aphids. All of the plants growing from these tubers showed symptoms of current-season leafroll in August.

Results since the 1954 introductions are shown in tables 1 to 4.

Maine table 1.--Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive years -- 1954-1956.

Pedigree	Parentage	Seedlings	Replanted		Surviving 3 years
		planted ₁ / in 1954-	1955	1956	
B 3558	B 859-10 x Katahdin	378	35	4	1
B 3559	B 859-10 x B 24-58	337	148	40	9
B 3562	B 2946-5 x B 24-58	246	59	21	1
B 3563	X927-3 x Katahdin	174	3	1	1
B 3578	Imperia x B 24-58	206	39	12	1

1/ 25 crosses and 3 selfed lines were planted in 1954.

Maine table 2.--Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of two successive seasons -- 1955-1956.

Pedigree	Parentage	Seedlings planted in 1955 ^{1/}	Replanted 1956	Saved for retesting in 1957	Surviving two inoculations
B 3802	B 859-10 x B 24-58	236	16	5	2.1
B 3806	B 2944-65 x B 24-58	241	4	1	.4
B 3808	B 2946-5 x B 24-58	254	12	4	1.6
B 3810	B 2962-6 x B 24-58	188	3	3	1.6
B 3815	B 24-58 x B 2834-3	250	15	8	3.2
B 3821	X927-3 x B 24-58	351	9	1	.3
B 3823	X927-3 x B 2834-3	290	5	1	.3
B 3824	X927-3 x B 2946-5	306	7	1	.3
B 3825	X927-3 x B 2963-7	351	10	4	1.1
B 3826	X1286-185 x B 24-58	218	31	11	5.0
B 3827	B 2925-23 x B 24-58	227	37	12	5.3
B 3848	B 2361-2 x B 2962-6	49	1	1	2.0
B 3850	B 2925-23 x B 2361-2	28	2	1	3.6

^{1/} 25 crosses and 3 selfed lines introduced in 1955.

Maine table 3.--Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1956.

Pedigree	Parentage	Seedlings planted in 1956	Saved for retesting in 1957	Surviving the first year's inoculation
		No.	No.	Percent
B 4087	Early Gem x B 2834-3	141	0	.0
B 4088	Houma x B 2834-3	315	5	1.6
B 4089	Houma x B 3299-13	279	8	2.9
B 4095	Rural New Yorker x B 2834-3	360	9	2.5
B 4096	Saco x B 2834-3	66	1	1.5
B 4103	792-94 x B 294-38	373	5	1.3
B 4104	792-94 x B 2962-6	262	0	.0
B 4107	927-3 x Earlane	334	7	2.1
B 4111	B 1172-14 x B 24-58	411	2	.5
B 4121	B 2925-23 x B 294-38	80	8	10.0
B 4122	B 2925-23 x Aquila	118	2	1.7
B 4123	B 2925-23 x B 2359-84	168	24	14.3
B 4124	B 2924-38 x B 738-8	46	0	.0
B 4125	B 2946-5 x Katahdin	384	2	.5
B 4126	B 2958-2 x B 3186-6	272	2	.7
B 4127	B 2962-6 x B 2359-84	264	16	6.1
B 4129	B 2969-15 x B 738-8	48	0	.0

continued

Maine table 3, continued.

Pedigree	Parentage	Seedlings planted in 1956	Saved for retesting in 1957	Surviving the first year's inoculation
		No.	No.	Percent
B 4133	B 3186-6 x B 294-38	366	1	.3
B 4139	B 3299-13 x B 2359-84	290	4	1.4
B 4140	B 3299-13 x B 2938-22	280	0	.0
B 4142	41956 x B 2962-6	244	7	2.9
B 4163	927-3 x B 606-3	69	3	4.3
B 4497	B 2834-3 selfed	188	0	.0
		5358	106	2.0

Maine table 4.--Reaction of selections of 29 crosses and 4 selfed lines from Chapman Farm, to leafroll infection resulting from artificial inoculation with viroliferous green peach aphids, in 1956.

Pedigree number	Parentage	Number tested	No. hills infected					
			0	1	2	3	4	5
B 3799	B 24-78 x Cherokee	52	-	-	-	3	1	48
B 3800	B 24-58 x Katahdin	21	2	-	1	2	1	15
B 3801	B 606-37 x B 24-58	13	1	-	-	-	-	12
B 3803	B 2067-52 x B 24-58	21	-	-	-	-	-	21
B 3804	B 2925-23 x Katahdin	72	-	-	1	-	4	67
B 3807	B 2944-65 x B 2067-52	51	-	-	-	-	1	50
B 3811	B 2966-6 x B 24-58	34	-	-	1	-	1	32
B 3813	B 24-58 x 3VW-9	37	1	-	-	-	1	35
B 3814	B 24-58 x B 2067-52	29	2	-	1	-	-	26
B 3817	B 779-1 x B 24-58	53	5	1	1	1	2	43
B 3818	792-88 x B 24-58	39	1	4	1	1	-	32
B 3819	792-94 x B 24-58	20	1	1	-	-	1	17
B 3820	927-3 x Katahdin	37	-	1	1	-	-	35
B 3822	927 -3 x B 2067-52	44	-	1	-	1	2	40
B 3828	Houma x Aquila	33	-	2	1	2	-	28
B 3829	Houma x Katahdin	16	-	-	-	-	-	16
B 3833	B 294-38 x B 2209-25	31	-	-	-	2	1	28
B 3834	ND457-1 x B 294-38	54	2	-	1	-	-	51
B 3835	ND457-1 x B 2359-84	40	5	2	1	2	-	30
B 3836	ND457-1 x B 2938-22	30	-	-	-	-	-	30
B 3840	B 606-37 x B 2359-84	3	-	1	-	-	-	2
B 3844	B 2359-84 x Katahdin	12	1	-	-	-	-	11
B 3845	B 2359-84 x B 766-55	5	-	-	-	-	-	5
B 3849	B 2834-3 x B 3186-6	13	-	-	-	-	-	13
B 3953	B 2962-6 x Ac. 25976	2	-	-	-	-	-	2
B 3956	Ac. 25953 x Katahdin	9	-	-	-	-	-	9
B 3958	Ac. 25953 x B 2938-22	4	-	-	-	-	-	4
B 3962	Ac. 25955 x B 2938-22	2	-	-	-	-	-	2
B 3990	B 24-58 x Ac. 25949	1	1	-	-	-	-	-
B 4458	B 24-58 selfed	41	2	2	-	-	-	37
B 4460	B 294-38 selfed	31	-	-	-	-	-	31
B 4463	B 766-55 selfed	3	-	-	-	-	-	3
B 4473	B 2968-7 selfed	8	-	-	-	-	-	8

1/ Each seedling had 5 plants tested.

MASSACHUSETTS
Karol J. Kucinski and Ralph W. Donaldson

Mass. table 1 shows yield and quality data of 17 varieties of potatoes tested in 1956 for comparative yields at the Massachusetts Agricultural Experiment Station, Amherst, Mass. Each variety was planted in 50-foot rows, replicated 4 times. A ton per acre of 10-10-10-2 fertilizer was applied in drill. The plots were sprayed weekly with 50% wettable dithane, 2 pounds per 100 gallons, supplemented with DDT as needed. Tractor and sprayer rows were eliminated by using a side-arm boom for spraying.

Mass. table 1.--Massachusetts potato variety tests, 1956, University Farm, Amherst, Mass.

Total yield rank	Variety	Yield per acre			Specific Gravity	Dry matter	Quality rank
		Size A	Size B	Total			
		Bu.	Bu.	Bu.	**	Pct.	
1	Teton	508	17	525	79	19.5	4
2	Katahdin	510	6	516	85	20.8	1
3	Cherokee	482	10	492	78	19.3	6
4	Delus	468	14	482	79	19.5	5
5	Cobbler	459	7	466	80	19.7	2
6	Russet Burbank	447	17	464*	75	18.7	9
7	B 2368-4	436	12	448	75	18.7	9
8	Houma	424	21	445	75	18.7	9
9	Pungo	394	7	401	78	19.1	7
10	Saco	392	9	401	76	18.9	8
11	Early Gem	391	7	398	75	18.5	10
12	Kennebec	379	10	389	72	18.0	11
13	B 920-7	369	6	375	75	18.7	9
14	B 595-76	351	7	358	78	19.1	7
15	Green Mountain	328	9	337	80	19.7	3
16	Sebago	260	10	270	68	17.1	13
17	Plymouth	236	10	246	71	17.8	12

* Only 50% U. S. No. 1

** Coded 1.0.

Mass. table 2 shows data of tests made on 3 different soil types in the Connecticut River Valley under farmer conditions of cultivation and spraying. One hundred feet of each row was harvested. The soil types were silt loam, fine loamy sand, and fine sandy loam, respectively, for farms A, B, and C.

Mass. table 2.--Massachusetts tests on 3 different soils on 3 different farm areas in Connecticut River Valley, 1956.

Variety	Farm A		Farm B		Farm C	
	Silt loam		Fine loamy sand		Fine sandy loam	
	Total yield per acre	Dry matter	Total yield per acre	Dry matter	Total yield per acre	Dry matter
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Green Mountain	397	18.5	484	19.6	530	20.2
Katahdin	462	17.3	617	17.9	419	18.5
Cobbler	455	18.3	399	19.0	380	19.0
Russet Burbank	540*	17.9	467**	19.2	552**	19.7
Teton	407	16.9	501	17.9	525	17.5
Pungo	477	18.1	564	17.4	491	19.2
Delus	520	20.7	460	19.5	455	21.0
Sebago	453	16.2	443	16.9	455	19.5
Plymouth	573	16.7	419	19.2	573	19.8
B 2368-4	624	16.4	283	17.1	530	18.7
Cherokee	644	16.9	254	18.8	380	19.3
Saco	697	17.5	419	17.7	762	19.8
Kennebec	653	16.8	269	16.9	632	19.7

* 25% U. S. No. 1

** 50% U. S. No. 1

MASSACHUSETTS

Eastern States Farmers' Exchange, Inc.
Robert A. Mullany

Four tests were planted in Eastern States territory in 1956: 1 in Massachusetts and 3 in widely scattered locations in Pennsylvania. Each planting was located in a commercial grower's potato field and, with the exception of planting, treated culturally as his own. Sprayer rows were not involved in these tests. The experimental design was the randomized complete block, with 4 replications at each location. Individual plots consisted of one 25-foot row with 10-inch spacing between plants. The following paragraphs give test locations and the fertilizer and cropping practices followed by each cooperator.

The farm of Reid Wissler is located on heavy loam soil in Ephrata, in southeastern Pennsylvania. Sod in 1954 was followed by tobacco and a ryegrass cover crop in 1955. 700 pounds per acre of 10-10-10 was plowed down, with 1,500 pounds per acre of 5-10-15-2 applied with planter in 32-inch rows. The test was planted April 23, topkilled September 7, and harvested October 1.

The Fred Oswald farm is located in New Tripoli, in northeastern Pennsylvania, and has a shaly loam soil. The previous year's crop was a timothy-alfalfa mixture in a potato-wheat-hay rotation. Ten tons per acre of manure, plus 25 pounds per acre of nitrogen was plowed down, 400 pounds per acre superphosphate was drilled after plowing, and 600 pounds per acre of 10-10-10 was applied with the planter in 34-inch rows. The test was planted May 17, topkilled September 1, and harvested October 12.

Ebensburg, in western Pennsylvania, is the location of the farm of cooperator John Norman Griffith. The soil type is a leavy loam. Ten tons per acre of manure and 500 pounds per acre of triple superphosphate were plowed down and 1,200 pounds per acre 6-18-18 was applied with the planter in 34-inch rows. The previous crop was an alfalfa-clover-timothy mixture, preceded by oats. The planting date was May 24 and harvest date October 15.

The Williams Bros. farm, located in Old Deerfield, Mass. has a sandy loam soil. Two years of tobacco preceded the potato crop. 2,000 pounds per acre 8-12-12 was applied with the planter in 36-inch rows. The test was planted May 16 and harvested October 25.

The weather at all locations was cooler and wetter than normal, with September conditions at Ebensburg and New Tripoli highly conducive to a blight-control problem. Ebensburg had blight conditions persisting through much of the growing season. However, control was good at all locations. Only Ephrata and Old Deerfield had dry periods of any duration. In general, good potato-growing weather prevailed.

The USDA was the source for Delus and Merrimack, while the Rukat sample was supplied by Mr. Clauson of Alpine, N. Y. Rukat displayed excellent yielding ability, but the lack of disease resistance and comparatively low dry-matter content will be a deterrent to general acceptance. Merrimack and Delus

continue to be outstanding in quality, with comparatively good yeilds. The small number of tubers set on Delus raises the question of performance at closer spacing. This variety also has a slight tendency to "shatter bruise". Early seedling B 605-10 shows some promise, despite a definite tendency to "shatter bruise" and develop growth cracks in 1956. For the second year, a definite decrease in the yield of Katahdin is correlated with a higher virus X content.

Eastern States tables 1 to 4 contain data on total yields, yields of tubers over 1 7/8 inches, yields of tubers over 1 7/8 inches free of off-shape, and dry-matter content.

Eastern States table 1.--Total yield per acre in bushels for 12 varieties grown at 4 locations in 1956.

Variety	Farmer and State				Average
	Wissler	Oswald	Griffith	Williams	
	Pa.	Pa.	Pa.	Mass.	
	Bu.	Bu.	Bu.	Bu.	Bu.
Katahdin - X free	744	738	701	665	712
Katahdin - 41% virus X	716	733	698	608	689
Katahdin - 74% virus X	681	673	615	599	642
Russet Rural	734	658	893	558	711
Sebago	679	614	678	563	634
Russet Sebago	679	671	683	551	646
Rukat	648	758	889	654	737
Merrimack	649	570	690	535	611
Delus	747	556	752	610	666
B 355-35	701	662	673	681	679
B 605-10	780	591	614	616	650
B 962-3	614	453	616	505	547

Eastern States table 2.--Yield per acre of tubers over 1 7/8 inches in size, free of off-shape, for 12 varieties grown at 4 locations.

Variety	Farmer and State				Average
	Wissler	Oswald	Griffith	Williams	
	Pa.	Pa.	Pa.	Mass.	
	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.
Katahdin - X free	694 93	692 94	650 93	602 90	660 93
Katahdin - 41% virus X	665 93	683 93	644 92	528 87	630 91
Katahdin - 74% virus X	636 93	623 92	548 90	541 90	587 91
Russet Rural	591 80	601 91	820 92	513 92	631 89
Sebago	592 87	556 90	566 83	491 87	551 87
Russet Sebago	630 93	600 89	622 91	461 84	578 89
Rukat	585 90	719 95	804 90	582 89	672 91
Merrimack	577 89	521 91	621 90	488 91	552 90
Delus	660 88	507 91	681 90	569 93	604 91
B 355-35	628 90	605 91	611 91	602 88	612 90
B 605-10	676 87	464 78	542 88	574 93	564 87
B 962-3	572 93	397 88	536 88	457 90	490 90
L.S.D. .05	NS	58	83	89	47

Eastern States table 3.--Dry-matter content of 12 varieties grown at 4 locations in 1956.

Variety	Farmer and State				Average
	Wissler	Oswald	Griffith	Williams	
	Pa.	Pa.	Pa.	Mass.	
	Pct.	Pct.	Pct.	Pct.	Pct.
Katahdin - X free	17.57	17.82	17.14	16.89	17.43
Katahdin - 41% virus X	17.32	17.75	18.12	16.95	17.54
Katahdin - 74% virus X	17.02	17.75	17.69	17.14	17.40
Russet Rural	19.17	18.92	20.74	17.02	18.96
Sebago	18.12	17.44	18.74	16.11	17.60
Russet Sebago	17.45	17.50	18.86	15.62	17.36
Rukat	17.14	18.32	18.25	16.16	17.47
Merrimack	21.24	20.10	20.42	18.55	20.08
Delus	20.30	19.66	20.67	18.80	19.86
B 355-35	18.12	18.25	19.30	16.65	18.08
B 605-10	19.73	18.12	17.99	17.94	18.44
B 962-3	21.12	19.29	19.79	18.55	19.69
L.S.D. .05	.95	.67	.97	.88	.43

Eastern States table 4.--Effect of pre-cut seed treatment on yield^{1/} of 4 late- and 4 early-maturing varieties grown at Hazardville, Conn., 1956.

Cut- ting dates	Late-maturing varieties				Early-maturing varieties			
	Sebago	Green Mountain	Kennebec	Katahdin	Chippewa	Cherokee	Cobbler	Pungo
1956	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
9/10	242	409	345	350	246	223	142	138
10/10	288	288	346	382	255	181	135	138
11/10	302	346	394	328	236	205	113	124
12/10	293	369	374	359	245	220	111	129
1/10	302	407	320	361	270	190	135	114
2/10	284	309	354	384	-	-	-	-
3/10	284	347	392	407	272	198	112	106
Fresh	268	339	354	351	206	199	133	141
L.S.D. 5% NS	NS	NS	NS	NS	NS	NS	NS	NS

^{1/} Average yield of 4 replications in bushels per acre of tubers over 1 7/8 inch, free of off-type.

Precut Seed Test on 8 Varieties

The two yield tests on pre-cut seed for late- and early-maturing varieties were sent to us from the U.S.D.A. at Presque Isle, Maine. The treatment of the seed prior to planting was the same as that of the U.S.D.A. since the seed sources were identical (P. I. table 10).

The tests were planted May 11, 1956 on sandy loam soil which had been in tobacco in 1954 and 1955. An application of 1,800 pounds of an 8-12-12 fertilizer was applied per acre in rows spaced 36 inches apart with a 10-inch

spacing between plants. An application of pre-merge burned the tops of some of the early-emerging plants, and a drought period starting late in July seriously affected the early variety yields. Late rains helped the later maturing varieties to come through a little better.

Eastern States tables 5 and 6 present the results of these two tests in percentage stand, number of weak plants, general vigor rating, and yield of U. S. No. 1 tubers. The stand and number of weak plants in Eastern States table 5 are very good when you consider that each cutting date figure is based on 400 plants. The yield data in Eastern States table 6 show no significant differences occurring between dates of cutting for any variety.

Eastern States table 5.--Summary of the effect of precut seed on the stand and vigor for late and early yield tests at Hazardville, Conn., 1956.^{1/}

Cutting dates	Late yield test			Early yield test			Average		
	Stand	Weak	Vigor rating	Stand	Weak	Vigor rating	Stand	Weak	Vigor rating
	Pct.	No.		Pct.	No.		Pct.	No.	
9/10	97.5	29	30	99.5	19	30	98.5	24	30
10/10	99.5	21	23	98.8	7	23	99.1	14	23
11/10	99.3	24	19	99.8	10	17	99.5	17	18
12/10	98.8	23	20	99.5	12	21	99.1	18	21
1/10	99.0	32	19	99.5	6	9	99.3	19	14
2/10	99.3	16	12	99.3	10	11	99.3	13	12
3/10	99.8	12	7	99.3	9	7	99.5	11	7
Fresh	98.5	10	14	99.5	4	18	99.0	7	16

^{1/} Readings of number weak and vigor taken June 25. The lower the vigor rating the better these entries looked, as of the above date.

0.47% Blind seedpieces recovered, majority in Katahdin and Sebago.

0.2% Rotted seedpieces recovered almost half of these in Chippewa variety.

1 blackleg-infected plant.

Eastern States table 6.--Effect of precut seed treatment on yield^{1/} of 4 late- and 4 early-maturing varieties grown at Hazardville, Conn., 1956.

Cut- ing dates	Late Variety Test				Early Variety Test			
	Green							
	Sebago	Mountain	Kennebec	Katahdin	Chippewa	Cherokee	Cobbler	Pungo
1956	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
9/10	242	409	345	350	246	223	142	138
10/10	288	288	346	382	255	181	135	138
11/10	302	346	394	328	236	205	113	124
12/10	293	369	274	259	245	220	111	129
1/10	302	407	320	361	270	190	135	114
2/10	284	309	354	384	-	-	-	-
3/10	284	347	392	407	272	198	112	106
Fresh	268	339	354	351	206	199	133	141
LSD 5%	NS	NS	NS	NS	NS	NS	NS	NS

^{1/} Average yield of 4 replications in bushels per acre of tubers over 1 7/8 inches free of off-types.

^{2/} The 2/10 date was discarded due to variety mixture.

MEXICO

John S. Niederhauser, Javier Cervantes,
and Keith Graham

Report on 1956 Toluca (Mexico) Field Test for Late Blight Resistance of
Seedlings sent by Robert V. Akeley

In 1956, 2771 seedlings, representing 29 families, were sent to us for planting in the field at the Santa Elena Agricultural Experiment Station. Fertilizer was applied at the time of rowing out at the rate of one ton per hectare of a 6-12-6 formula. Planting was done by hand, spacing the plants 50 cm. apart in the row. Erdgold checks were planted after every 10 seedlings. No fungicide was applied during the growing season. Regular insecticide treatments were made with DDT and Parathion.

The same scale used in previous years was employed to evaluate the late blight infection: 0, no infection; 1, very few lesions (1-5); 2, slight infection; 3, moderately blighted (up to 50% foliage blighted); 4, severely blighted; 5, dead.

Late blight was first observed in the plots on June 23. It slowly became established, and by the end of July the check plants were completely dead.

In the following table, the reading made on August 28 was considered final.

1956 Field test for resistance to late blight, USDA seedlings, Toluca, Mexico

Acc.No.	USDA pedigree	Parentage	0	1	2	3	4-5	Total
US-266	B 4189	B 929-6 x Ac 25976				5	145	150
US-267	B 4190	B 3139-24 x Ac 25976					57	57
US-268	B 4191	B 3195-3 x Ac 25976				4	364	368
US-269	B 4192	B 3401-20 x Ac 25976				2	156	158
US-270	B 4193	B 3406-3 x 9628					26	26
US-271	B 4194	B 3406-3 x Ac 25976					139	139
US-272	B 4195	B 3407-3 x DyK 5230				1	95	96
US-273	B 4196	B 3443-6 x Ac 25976					88	88
US-274	B 4198	B 3483-55 x B 919-15			1	3	10	14
US-275	B 4199	B 3483-55 x B 922-3			1	12	114	127
US-276	B 4200	B 3483-55 x 1376-6					13	13
US-277	B 4201	B 3483-55 x B 3418-10					14	14
US-278	B 4202	B 3483-55 x B 3418-55					28	28
US-279	B 4203	B 3483-55 x B 3452-1					14	14
US-280	B 4204	B 3483-55 x B 3508-8					29	29
US-281	B 4205	B 3483-55 x Ac 25976					58	58
US-282	B 4207	B 3508-8 x DyK 5230					64	64
US-283	B 4208	B 3508-8 x Ac 25976					40	40
US-284	B 4209	B 3516-11 x B 355-24				6	121	127
US-285	B 4210	B 3516-11 x B 922-6					59	59
US-286	B 4211	B 3516-11 x B 929-6				1	23	24

continued

1956 Field test for resistance to late blight, USDA seedlings, Toluca, Mexico, continued.

Acc.No.	USDA pedigree	Parentage	0	1	2	3	4-5	Total
US-287	B 4212	B 3516-11 x DyK 5230				3	175	178
US-288	B 4213	B 3516-11 x B 3410-22				3	151	154
US-289	B 4214	B 3516-11 x Ac 25976					308	308
US-290	B 4215	3VW-9 x Ac 25959			5	13	195	213
US-291	B 1507	3 x E-1 selfed					66	66
US-292	B 1508	3 VW-9 selfed				1	119	120
US-293	B 1509	B 3406-3 selfed					14	14
US-294	B 1510	B 3516-11 selfed					25	25
Total			0	0	7	54	2710	2771

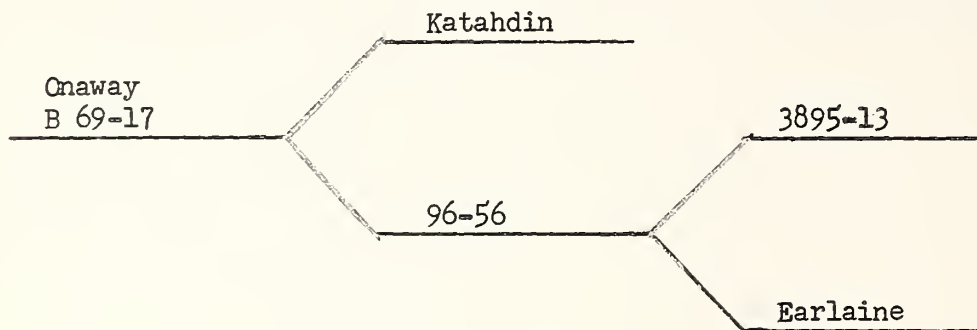
MICHIGAN

E. J. Wheeler and H. C. Moore

Seedling number B 69-17 was named Onaway in 1956. It has been grown for several years at the Michigan Experiment Station and by several farmers. The Onaway is a high-yielding, early variety. Maturity rating is the same as the Irish Cobbler. It has high resistance to common scab and in a limited test it has shown field resistance to late blight. It is susceptible to Virus X. Leaf roll and spindle tuber have not been a problem in this new variety.

Thirty-three acres were grown under certification in Michigan in 1956. The seed was all purchased by growers at harvest.

Pedigree



Seedling 3895-13 was a U.S.D.A. blight-resistant selection from a progeny grown from true seed of Dr. Müller's W variety which seed he sent to the U.S.D.A. in the early thirties.

MINNESOTA

Horticulture: F. A. Krantz and F. I. Lauer

Plant Pathology: Carl J. Eide, H. David Thurston and Kenneth W. Knutson

Field Resistance to Late Blight

A preliminary report was given last year (1955) of a test of 959 clones for field resistance to late blight. Data were presented illustrating the range of resistance found in the R_0 , R_1 , and R_2 clones. Inoculation was made on July 8 with races O(A), 1,4(BD), and 2,4(BG) of *P. infestans*. The interest in field resistance within *S. tuberosum* (R_0 clones) warrants a more detailed presentation of the resistance in this group. This presentation gives:

1. The field resistance to late blight of 24 named varieties.
2. Prevalence of field resistance to late blight in 169 clones resistant and 69 clones non-resistant to heat.
3. Field resistance to late blight of individual clones in the scab-resistant group.
4. Field resistance to late blight in the selfed progenies of a clone with low, and a clone with intermediate resistance.

Field Resistance to Late Blight in Named Varieties. The percentage of green foliage remaining on each of 24 varieties 26, 33, and 40 days after inoculation is given in Minn. table 1. The varieties are listed in order of rank from low resistance.

Minn. table 1.--Field resistance to late blight in some named varieties.

Green Foliage				Green Foliage			
Variety	Days after inoculation			Variety	Days after inoculation		
	26	33	40		26	33	40
	Pct.	Pct.	Pct.		Pct.	Pct.	Pct.
Early Ohio	5	0	0	Triumph	40	5	0
Waseca	10	0	0	Katahdin	40	20	5
Satapa	10	0	0	Green Mountain	40	20	5
Warba	15	0	0	Kasota	70	10	5
Red Warba	15	0	0	Sequoia	50	20	10
Mesaba	20	0	0	Red Pontiac	70	20	10
Cobbler	20	0	0	Sebago	70	30	5
Chisago	30	0	0	President	90	20	10
Sheridan	30	0	0	Redkote	80	50	30
Redglo	30	0	0	Alpha	95	70	40
Russet Rural	30	0	0	Voran	95	80	50
Russet Burbank	30	5	0	Ostbote	95	90	70

The level of resistance found in Pontiac, Sebago and President has a recognized protective value in commercial production. The Pontiac obtained from a cross of Triumph by Katahdin is concrete evidence that these latter varieties carry some genes for resistance.

Field Resistance to Late Blight in Numbered Clones. Of the 261 numbered R₀ clones in the test, 45 had resistance as high or higher than the Pontiac. Most of these 45 clones (93 percent) also had resistance to common scab. This was 21 percent of the scab-resistant clones in the test (Minn. table 2).

Minn. table 2.--Field resistance to late blight of scab and non-resistant R₀ clones. (named clones omitted)

Scab class	Total tested	Field resistant to late blight	
	No.	No.	Pct.
Susceptible	69	3	4
Resistant	192	41	21

The percentage of green foliage at 26, 33 and 40 days after inoculation are given for the 41 scab-resistant clones plus Hindenburg and Jubel in Minn. table 3. Hindenburg and Jubel have a slightly lower level of resistance than Ostbote and Voran (Minn. table 2). The numbered clones start at this level and by imperceptible degrees fall to the level of Pontiac. Less resistant than Pontiac were the remaining 151 scab-resistant clones (79 percent). The data in Minn table 3 show the quantitative nature of field resistance which prevents the classification of the clones into discrete categories.

Minn. table 3.--Field resistance to late blight of 44 clones having scab resistance.

Designation of clone	Green foliage Days after inoculation			Designation of clone	Green foliage Days after inoculation		
	26	33	40		26	33	40
	Pct.	Pct.	Pct.		Pct.	Pct.	Pct.
52-5-5	90	75	50	804-14	90	60	10
Hindenburg	95	70	50	44.47-3-53	80	50	15
Jubel	90	60	40	2.47-7-49	80	40	10
60.44-6-43	95	70	30	Minn 11	70	50	10
23-1-2-1	95	70	30	45.49-7-52	50	40	20
23-1-2-3	95	80	20	59-11-6	90	30	10
10.46-1-48	70	60	30	26.47-4-49	60	60	20
119.49-1-51	70	60	30	229.51-2-53	90	40	15
15.50-7-52	70	60	30	24.48-4-1	95	40	10
202.51-3-53	90	60	30	79.49-3-51	70	40	15
528-170-1	90	70	20	2.47-7-49	80	40	10
Minn 1-9	90	60	30	52.47-11-50	60	40	10
192.51-6-53	90	70	15	118.49-13-53	70	30	15
528-170	90	40	30	25.48-17-53	70	30	10
528-170-3	90	60	20	804-4	90	40	10
528-170-5	95	60	10	23-1	70	40	10
804-7	90	40	20	Minn 1	60	40	10
23-1-6-1	95	60	15	804	80	20	5
Minn 12	80	60	15	47-4	60	10	10
45.47-1-50	70	60	15	Checks			
122.49-4-50	70	50	20	Waseca	10	0	0
125.49-7-50	60	50	20	Pontiac	70	20	10
44.47-2-53	80	50	20	Russet Rural	30	0	0
26.48-1-53	80	40	20	Ostbote	95	90	70

Field Resistance to Late Blight in Two Selfed Progenies. Field resistance to late blight as indicated by the percentage of green foliage remaining 30, 33, and 40 days after inoculation is given for 2 selfed progenies in Minn. table 4. The parent clone (528-170) had 70 percent and 15-2-10-1-2 had no green foliage 30 days after inoculation. The low resistance indicated in the progeny of 15-2-10-1-2 seems to illustrate the wide range of segregation obtained in the progeny of 528-170. The latter clone was classed as intermediate in its clonal resistance in relation to the resistance of Ostbote. It also occupies an intermediate position in relation to its progeny. The range of resistance in its progeny extended from clones with a resistance equal to or higher than Ostbote to as low or lower than the Red Pontiac. The wide range of segregation obtained in the 39 clones from the progeny of 528-170 suggests that selection in successive progenies of early maturing advanced selections as Minn. 1, 11 and 12 (Minn. table 3) would give early clones highly field resistant to late blight. These advanced selections have been in the regional uniformity trials. They range in maturity from Warba to Pontiac.

Minn. table 4.--Field resistance to late blight in the selfed progeny of an intermediate and of a low resistant clone.

Parent and progeny clone designate	Green foliage Days after inoculation			Parent and progeny clone designate	Green foliage Days after inoculation		
	30 Pct.	33 Pct.	40 Pct.		30 Pct.	33 Pct.	40 Pct.
528-170- 6	95	99	99	528-170-13	90	60	50
-20	95	95	95	-27	80	70	50
-53	95	95	95	528-170 (parent)	70	70	50
-22	95	95	90	528-170 (parent)	70	60	50
-17	95	90	90	528-170- 5	70	60	50
- 9	90	95	85	-21	90	60	40
-26	95	95	80	- 4	80	50	40
-18	95	95	80	-14	80	50	30
-28	95	90	80	-52	80	50	30
-41	95	80	80	-37	60	40	40
-25	90	80	70	-48	80	40	30
-45	90	80	70	-43	80	40	30
- 8	90	80	70	-42	60	40	30
-32	80	80	70	-55	60	30	30
-56	90	70	60	-24	50	30	20
-33	80	80	60	-19	40	20	10
-30	90	70	60	-10	20	15	10
-39	90	50	60	-38	50	30	5
-35	80	70	60	- 7	30	20	5
-34	80	70	60	-12	30	20	5
-47	90	80	50	Red Pontiac (check)	40	10	10
15-2-10-1-2-41	30	30	20	15-2-10-1-2-21	0	0	0
- 5	35	15	5	-25	0	0	0
- 9	20	5	5	-31	0	0	0
-46	10	0	0	-54	0	0	0
-12	5	0	0	- 6	0	0	0
15-2-10-1-2 (Parent)	0	0	0	-45	0	0	0
-16	0	0	0	-49	0	0	0
-11	0	0	0	- 3	0	0	0
-12	0	0	0	Chisago (check)	5	5	0

In 1956 only race 1,4 (BD) and 2,4 (BC) were used. The results confirmed the 1955 data presented above as the following comparison of some representative clones indicates (Minn. table 5).

Minn. table 5.--Field resistance in 1955 and 1956.

Variety	Green foliage		Variety	Green foliage	
	1955	1956		1955	1956
Group 1	%	%	Group 2	%	%
Chisago	0	10	96-56-111	80	40
Pontiac	40	40	96-56-23-1	10	0
Ostbote	90	90	96-56-22-4	80	60
Group 3					
58-2-1	20	20	Minn 355	90	40
58-2-4	80	100	Minn 358	60	30
			Cherokee	40	50
58-2-5	0	5	Kennebec	70	50

The results of this exploratory study indicates that a large amount of field resistance to late blight exists in clones that are equal in other characters to the commercial varieties. This resistance is present in R₀ (S. tuberosum clones) discussed above and in the named varieties and advanced selections of the R clones (S. tuberosum x S. demissum hybrids) given in 1955 report.

Races of Phytophthora infestans in Minnesota. During the summer of 1956 standard differential varieties were planted in the field at Castle Danger. From lesions on these races 1,2 and 1,2,4 were isolated for the first time in Minnesota. Races 0; 1; 4; 1,2; 1,4; 2,4; and 1,2,4 have now been found occurring naturally in Minnesota.

Parental Clones. The clones used most frequently in test crosses the past year to obtain commercial varieties are:

Parent Clone	Outstanding Characteristics
69.49-4-51	High scab resistance, early, and pollen fertile
55.50-26-52	High scab resistance, excellent tuber and vine type
71.48-4-50	High scab resistance, early and excellent vine type
50.49-7-51	High scab resistance, and pollen fertile
M355	Early, good vine type, field resistant to late blight, R1 immunity gene for late blight.
58-2-4	Early, good vine type, high field resistance to late blight, R2 immunity gene for late blight. Pollen fertile.
56-1	Extra early, broad leaves, erect stems, low tuber set and pollen fertile.
Osseo	Extra early, broad leaves, erect stem and low tuber set.

These clones have a desirable overall combination of characters. The special Characters that made them desirable parents are: A scab resistance equal to Hindenburg in the first 4 clones; earliness combined with field resistance to

late blight in Minn 355 and 58-2-4; and the ability to transmit characters needed for adaptation to Minnesota conditions in 56-1 and Osseo. The latter 2 are very similar except for differences in pollen fertility. Their value for transmitting adaptation to a progeny in crosses with unadapted clones is well established.

Advanced Selections. Three advanced selections were distributed in small lots to seed growers the past 2 years. These selections, Minn 11, 20, and 355, will be named as soon as sufficient stock becomes available.

MINNESOTA
Orrin C. Turnquist

Potato Variety Demonstration Plots

Each year the Agricultural Extension Service of the University of Minnesota conducts demonstration plots in various commercial vegetable-producing areas of the State. These plots are conducted in cooperation with commercial growers, county agricultural agents, branch experiment stations, and the State seed department. The purpose of these plots is to familiarize the grower with new varieties and to assist him in evaluating the varieties for use in his area.

In 1956 these plots were located at Baker and Oslo in the Red River Valley; at Anoka in the sand land area; and at Hollandale on the peat. One hundred pounds of seed of each variety was planted in a double row with a commercial planter. The plots were laid out in a randomized block design in the growers' commercial field of potatoes and replicated twice. At harvest the potatoes from a row within the double row of each variety were weighed and graded by a Federal-State inspector. Specific gravity of the varieties was obtained immediately after harvest.

The total yield, percent of U. S. No. 1 grade, and dry matter are presented in Turnquist table 1. Saco averaged the highest in yield over all 4 locations. The tubers were quite rough in shape, but the eyes were shallow. Red LaSoda continued to produce high yields in the Red River Valley and Anoka. The color was an intense bright red at all locations. The new variety Tawa appeared to have a low yield and a large number of tubers with growth cracks. Dry matter was excellent. Some hollow heart and scab were observed in Tawa. Dazoc set a large number of tubers that were very uniform in size and shape. The size was generally small, but the red color excellent. Wider spacing of this variety is probably necessary for better size development.

Russet Burbank was low in yield at most locations. Tubers were small and irregular in shape, but this variety was among the highest in dry matter. Early Gem again appeared to be the lowest in dry matter of varieties tested. It also was one of the poorest varieties to make U. S. No. 1 grade. Russet Rural, although tested at only 3 locations, produced fair yields of smooth attractive tubers. Dry matter averaged highest of all varieties tests. Rushmore showed 20 percent hollow heart at one location, and the tubers were pointed and misshapen.

Red Beauty had very poor color and general appearance on the peat. It appeared to be extremely susceptible to pitted scab at Hollandale. Antigo produced a good yield of attractive tubers with no evidence of scab on the peat soil.

In Turnquist table 2 are presented the yield and other data of several varieties tested in smaller 25-hill plots at 6 locations in Minnesota.

Turnquist table 1.--Performance of potato varieties in Minnesota in 1956.

Variety	Baker			Oslo			Anoka			Hollandale			State average		
	Total yield Cwt	S. No. Pct.	Dry Matter Pct.	Total yield Cwt	S. No. Pct.	Dry Matter Pct.	Total yield Cwt	S. No. Pct.	Dry Matter Pct.	Total yield Cwt	S. No. Pct.	Dry Matter Pct.	Total yield Cwt	S. No. Pct.	Dry Matter Pct.
Saco	247	74	21.4	262	70	22.7	339	74	20.9	383	80	20.1	308	74.5	21.2
Red Pontiac	220	82	18.9	248	92	20.5	298	74	17.6	404	81	16.1	292	82.2	18.2
Red Lasoda	244	67	19.3	234	91	21.1	356	75	18.2	297	78	17.9	283	77.7	19.1
Redburn	180	82	19.3	250	93	20.6	296	74	17.2	392	82	18.4	280	82.7	18.8
Kennebec	244	66	20.0	224	78	20.2	284	67	20.5	306	82	20.1	264	73.2	20.2
Irish Cobbler	200	82	19.8	191	81	22.4	330	83	19.3	322	81	20.1	261	81.7	20.4
Waseca	166	89	18.1	230	83	21.2	305	80	16.5	304	88	16.8	251	75.0	18.1
Dazoc	206	82	18.9	232	90	21.4	288	83	17.3	238	76	18.5	241	82.7	19.0
P-40	162	80	18.5	211	71	20.9	346	85	17.3	219	64	18.2	234	75.0	18.7
Redkote	181	80	19.8	181	83	20.8	284	89	17.6	283	73	18.4	232	81.2	19.1
Early Gem	174	66	18.3	233	88	19.8	315	71	16.0	195	63	15.9	229	72.5	17.5
Cherokee	206	71	20.2	209	88	22.1	256	76	20.3	247	77	20.0	229	78.0	20.6
Russet Burbank	151	62	20.6	187	83	22.4	228	76	20.6	218	69	20.1	196	72.5	20.9
Tawa	153	61	20.0	161	73	22.0	255	69	18.9	192	80	19.1	190	70.7	20.0
Russet Rural	232	88	20.2	209	88	22.6	254	87	21.9	-	-	-	232	87.6	21.5
Rushmore	156	60	19.5	-	-	-	205	80	19.9	-	-	-	189	73.0	18.8
Antigo	-	-	-	-	-	-	-	-	-	205	79	17.2	301	87	18.7
Red Beauty	-	-	-	-	-	-	-	-	-	271	65	18.7	271	65.0	18.7
Manota	-	-	-	-	-	-	-	-	-	-	-	-	171	90.0	20.2
Average	177	90	20.2	-	-	-	-	-	-	-	-	-	-	-	-
LSD 5%	182.2	-	19.6	217.4	-	21.3	289.9	-	18.7	281.0	-	18.4	245.2	-	-
LSD 1%	47	-	-	42	-	-	75	-	-	102	-	-	32	-	-
	70	-	-	63	-	-	113	-	-	152	-	-	49	-	-

Cooperators:

Baker, Minn. - Eugene Peterson
Oslo, Minn. - Earl Mallinger
Anoka, Minn. - Walter Brunzell
Hollandale, Minn. - C. Mullenburg

1/ Based on 3 locations only
2/ One location only

Turnquist table 2.-Performance of potato varieties, 6 locations in Minnesota, 1956.

Variety	Cambridge		Brainerd		Little Fork		Warroad		McIntosh		Carlton	
	Total yield per acre	Cwt.	Total yield per acre	Cwt.	Total yield per acre	U. S. No. 1	Total yield per acre	U. S. No. 1	Dry matter	Total yield per acre	Total yield per acre	Dry matter
Red Pontiac	551		457		272	83	588	94	18.7	148	277	18.3
Redburt	681		341		244	81	257	73	18.3	75	213	20.0
Red Lasoda	488		446		369	96	426	94	18.1	138	202	18.9
Kennebec	698		325		307	74	441	88	19.1	96	227	19.6
Irish Cobbler	454		176		125	68	247	64	19.1	129	181	19.8
Dazoc	528		324		238	71	401	66	19.8	127	167	18.5
Waseca	579		253		210	75	333	90	18.7	69	181	18.1
Redkote	630		286		204	82	501	89	20.0	77	302	19.3
Cherokes	568		171		278	77	440	83	20.0	92	263	20.6
Early Gem	522		396		96	52	416	85	17.7	140	202	19.8
Tawa	-		-		142	80	320	76	18.7	110	195	20.2
Rushmore	-		-		216	63	327	75	19.3	119	-	-
Russet Burbank	-		-		-	-	-	-	-	162	241	22.1
Manota	-		-		-	-	-	-	-	150	163	19.1
Chippewa	-		-		-	-	-	-	-	-	263	18.3
Green Mountain	-		-		-	-	-	-	-	-	177	20.6
Early Rose	-		-		-	-	-	-	-	-	121	21.0
Average	570		318		225		391		19.0	116	211	19.6

Cooperators: Cambridge - Royal Anderson
 Brainerd - Ray Norrgard
 Little Fork - Erickson Farm
 Warroad - C. Meeker
 McIntosh - Harley Shurson
 Carlton - Merle Olson

MISSISSIPPI
W. S. Anderson

Five varieties or selections were planted in 1956 with western-grown seed, 1 of them from 2 sources. One was planted with Tennessee-mountain-grown seed also, and a sixth was planted with North-Carolina-grown seed. One was planted with seed grown in Mississippi in 1955. Plots were planted February 27, after 3,000 pounds of 6-8-8 fertilizer had been plowed down broadcast a month and immediately after applying 1,700 pounds of same side placed on both sides of 4-foot rows. The soil is classified as Kaufman fine sandy loam. Seed pieces were spaced 12 inches apart, and practically perfect stands were secured on all plots in 6 randomized blocks of single-row 25-hill plots. Irrigation was supplied several times with a sprinkler system as needed during an unfavorable growing season. Insects were controlled with cryolite sprays. The plots were harvested June 11, and the results are shown in Miss. table 1.

Miss table 1.--Yield per acre, specific gravity, and maturity of potatoes tested in 1956.

Variety	Yield per acre		Specific gravity	Solids Pct.	Maturity
	No. 1 Bu. (60 lbs.)	Others Bu. (60 lbs.)			
Red LaSoda ^{1/}	144	27	1.071	17.7	Late
Red LaSoda ^{2/}	128	40	1.065	16.5	"
Boone ^{3/}	38	24	1.070	17.4	Very Late
Red Pontiac ^{1/}	127	51	1.063	16.0	Medium early
Rushmore ^{2/}	34	26	1.081	19.9	" "
U. S. 1859 ^{4/}	111	42	1.066	16.7	" "
U. S. 1859 ^{5/}	81	44	1.067	16.9	" "
LaSoda ^{6/}	47	48	1.071	17.7	Early
LSD at 5%	27	--	-----		
at 1%	36	--	-----		

^{1/} Seed from Nebraska

^{2/} Seed from South Dakota

^{3/} Seed from North Carolina

^{4/} Seed from North Dakota

^{5/} Seed from Tennessee

^{6/} Seed grown at State College spring 1955.

The data show that the season was not favorable for good yields, and all yields were lower than normally expected for adapted varieties. The yields show that U. S. 1859 is worthy of further trials, and that both strains of LaSoda are good for this area. These are being recommended in this State for home and commercial planting as the best red potato available at this time.

NEBRASKA

H. O. Werner, Project leader, Robert O'Keefe, G. James Dinkel, Richard Miyoshi and Lionel Harris

Major accomplishments of the year:

Tests of advanced selections and standard varieties in field tests and cooking tests.

Methods with field tests.

Methods with cooking tests.

Status of Nebraska red tuber varieties

Status of advanced Nebraska red selections.

Status of white scab-resistant advanced selections.

Chip tests

Graying and blackening of raw potato slices.

Heat resistance.

Project NC 35

Major accomplishments

The major accomplishments of the Nebraska program during the current year seem to have been:

1. Attainment of a high degree of homozygosity for red skin color and good tuber type in a group of lines. The measure of this is the high percentage of segregates with tubers of good red color and good type that have been found in families of some of the recent crosses. A number of these also possess good interior color, freedom from tuber defects and high specific gravity. The most distinctive of the lines from which desirable progenies have been obtained are: 93.48-1, 95.48-1, 72.49-1, 131.50-2, 181.50-2, 215-50-2, and Redbake. Pedigrees and descriptive information about these lines will be found in the later referred to mimeograph report to the N. C. Potato Committee and in recent annual copies of the National Potato-Breeding Program reports.
2. The acquirement of red-skin lines with relatively high degrees of scab resistance.

The major lines with very high scab resistance are as follows:

A. With good commercial characteristics:

<u>Clone</u>	<u>Probable source of resistance</u>
114.51-2	Hindenburg, Menominee
156.52-2	Jubel, Hindenburg, Menominee
45.51-4	Hindenburg, Jubel

B. Good for breeding but lacking some important commercial characters:

86-49-1X	Nebr. 51.49-P1 and Jubel and Hindenburg.
143.49-1	Hindenburg
104.52-2	Hindenburg and Jubel

The first two of these lines are being increased rapidly to test their suitability for commercial use. These and some of their progenies are being used in the crossing program to establish improved lines and to attain superior varieties.

3. The initiation of a program for determining the degree of resistance or immunity of all advance lines to virus X and the isolation and increase of X-free strains within all advance lines. With the serological technique the following clones have thus far been found free of virus X:

369.51-1
392.51-3
395.51-2
156.52-2

Among the better Nebraska advanced selections the following have been found to have a very low percentage of X-infected tubers:

120.40-6
223.48-1X
82.49-1X
215.50-2
Redglo
315.48-3X

A number of recent crosses include one X-immune parent. In the current crossing program Iowa and North Dakota X-immune selections are also being used as parents.

4. By accumulation of screening tests of various kinds - screening out a group of clones of very promising quality. The more thoroughly tested of these and their major assets are the following:
223.48-1X. Round white russet, very high scab resistance, versatile adaptability, fair to good interior and cooking qualities. May be released to seed growers in 1957.

82.49-1X. Bright red tubers of good type, midseason to late, very productive, interior flesh very white. Cooking quality good. Being considered for early release.

29.47-2. Large round white tubers, late, medium to high scab resistance. Acceptable culinary quality. High yield.

Less advanced but very good lines are:

156.48-2X. Medium red, good type tubers. Very good culinary quality. Exceptionally high yields and high percentage of U. S. No. 1 potatoes.

315.48-3X. Long, large bright pale red tubers of good cooking quality, but quite susceptible to scab.

215.50-2. Exceptionally fine type long elliptical medium red tubers. Acceptable culinary quality but possibly lacking yielding capacity.

5. The release of a good type red tuber variety suitable for baking, chip making, and french frying. This is the variety Redbake (26.44-1). Seed stocks were released to certified foundation seed growers in 1956. A very comprehensive report of the results of more than 60 field tests throughout 5 years were compiled in "ditto" style in a compendium of which a limited number of copies are available to anyone requesting same. Reports from trials in about 10 other States indicate that it generally has been above average productivity and the market quality and specific gravity have been high.
6. The ring-rot infection that was discovered in some lots in the project in 1953 has apparently been brought under very effective control, perhaps eliminated. No infected plants or tubers were detected in 1956, although a diligent series of careful inspections were made at close intervals of time throughout late August and September. This was accomplished by indexing large numbers of stems to locate clean plants, checking the tubers under ultra-violet light, dividing seed stocks for increase into hill and tuber unit lines and many sanitary precautions. Among the latter have been: (a) At planting time, etc., the continual disinfection of cutting knives, disinfecting working surfaces before handling each lot of seed potatoes, using gloves that are constantly being disinfected, having a spray of disinfectant on all parts of the plants coming in contact with the seedpieces. (b) Planting dry-land plants 48 x 22 inches so as to provide adequate moisture so that vegetative growth will not be curtailed before ring-rot symptoms can develop in the plants. (c) At harvest time have all pickers wear gloves that are disinfected between lots; thoroughly drench the digger with a formaldehyde spray before each variety or subline is dug; with a specially built conveyor put potatoes

directly into new or disinfected wooden baskets or 50-pound paper bags and frequently disinfect the trucks that haul the potatoes out of the field. (d) Cleaning and disinfecting the storage thoroughly and when sorting, cleaning, and spraying the sorter thoroughly between the handling of successive lots of potatoes.

7. Resumption of tests of heat and drouth endurance of plants of advanced selections.

Tests of Advanced Selections and Standard Varieties
in Field Tests and Cooking Tests

The decisions in the evaluating of varieties and for the formulation of programs of work are based on the observations in:

- A. Field clonal plantings of 5 to 10 hills, one on dryland at the Box Butte farm where all seed stocks are maintained; one on a scab-infested irrigated farm in Scotts Bluff County, and two irrigated plats at the Scotts Bluff Experiment Station, one planted in mid-June and one the last few days of June. The previously mentioned reports are based largely on the data from these tests.
- B. Eleven replicated yield tests distributed on dryland or irrigated farms from an altitude of 900 feet near Omaha in eastern Nebraska to 5,300 feet in western Nebraska.

Some of the major findings with these field tests, cooking and chip making tests with the most advanced lines and with some varieties are presented hereinafter.

Methods with field tests. Data on 6 factors from trials of 8 advanced Nebraska selections, 5 Nebraska red varieties, and 3 other red varieties, from 8 of the 11 replicated yield tests, are presented in Nebraska tables 1 to 6. In each of these trials each variety was planted in 4 randomized single-row plats of 20 hills each. Total yield data were obtained at harvesttime for each single row plat. Yields of U.S. #1 A-size tubers and percentages of each grade or defect class were calculated from data obtained by sorting the potatoes from all plats of one variety as one composite lot. Specific gravity was determined with a hydrometer from three 8-pound randomly acquired samples of U. S. #1 grade A-size.

Methods with cooking tests. Since the preparation of the 1955 report, 3 extensive cooking tests with panels of judges were conducted comparing a number of advance lines with standard varieties being grown in Nebraska. The means of the scores for various components of quality as given by the various judges are shown in table 7.

The first of these tests (A) comprised late crop tubers grown on dryland in Banner County (5,300 feet altitude - 5 miles from the Wyoming boundary) and with irrigation at the Scotts Bluff Experiment Station (4,000 feet altitude). They were stored at 75° till cooking time in mid-April. Test B, in August, comprised early crop potatoes grown with irrigation at Hershey (15 miles west of North Platte - altitude about 3,000 feet). Test C was made in December with potatoes from the Scotts Bluff Station 1956 crop. They were stored at 50° - 75° all the time from harvest to cooking time.

The procedure followed was to steam 4 medium-size tubers of 6 varieties at each cooking period, two periods each day. Each variety was included in 3 to 6 cooking periods (numbers reported in table headings). The varieties were randomized within different sets cooked at various periods so that each variety was compared at 2 periods with each other variety. Thus 3 consecutive testing periods comprised one "replicate" when 18 varieties were being tested.

Because of the differences in rate of color changes after cooking, it was deemed advisable to alter the scoring values (reported in the column heads after each component) which have been used in our previous tests. The old system was used with series A, but a new system was initiated with series B and altered slightly for series C. These slight differences in value must be considered in making comparisons between series for all except general rating values which were always based on the total score (100 maximum possible).

Status of Nebraska Red Tuber Varieties

Redbake (26.44-1) released in 1956, when evaluated by U. S. #1 yields, was possibly the most satisfactory of the Nebraska varieties in western Nebraska trials. In the central Nebraska irrigated trial at Cozad the production was on a par with all of the red varieties except Lasoda and Red Pontiac, and although not considered scab resistant, the percentage of scabby tubers was consistently relatively low. The high percentage of U. S. #1 tubers, very good type and high specific gravity, render this a very desirable market variety. In the 4 cooking trials it was rated best of all the red varieties now available. It was usually quite good for chips.

Progress. Still commands respect because of good yields of U. S. #1 potatoes and attractive market qualities. Its comparative scab freedom is an important asset. In culinary quality it was among the lowest variety group. The tubers tended to be small except when yields were very high.

Dazoc has rapidly become a major early red variety in central Nebraska and attracted much attention in several other States and in the province of Ontario, Canada, in 1956, chiefly because the dark-red tubers have been of much better grade quality than the Red Warba. In the western trial yields were below those of most of the other red varieties. Its importance in that area is for seed production for early areas. The culinary quality was usually slightly better than that of Red Warba.

Sheridan tubers have been bright medium red and usually of very good type. Yields have not been equal to those of Dazoc. The culinary quality is much like that of Dazoc.

Redglo was one of the most productive varieties, with tubers of excellent dark red color. The deep eyes, low specific gravity and poor culinary quality mitigate its use in Nebraska except for seed production. In certain southern and intermediate areas it has enjoyed great popularity this past season.

All of these varieties were superior to Triumph because of the high percentage of mechanically injured and off-grade potatoes and only fair culinary quality of Triumph. Lasoda and Red Pontiac are very attractive to growers because of high yields, but their numerous over-size and rough tubers and low culinary quality are serious deficiencies influencing financial returns.

Status of Advanced Nebraska Red Selections

Of a group of about a dozen advanced selections that have been tested in these trials for several years, three are being increased for release to growers and three others are being scrutinized carefully because of their distinctive characteristics. All of these seem superior for one or several reasons to existing red varieties. The three most advanced selections are:

82.49-1X. A medium to late line, producing good type, bright medium red tubers of intermediate size. Yields are high, formerly relatively higher than in 1956. The interior flesh color is unusually white. The specific gravity is high, and culinary quality has been among the best. It has very bright white color when cooked and has retained this color better than any of the other varieties. It has not seemed satisfactory for chipping. It has exhibited appreciable heat endurance. It is not considered suitable for early areas. It may be released to seed growers in the spring of 1957. Thus far very few of the tubers appear to be infected with virus X.

315.48-3X is a midseason line producing uniformly large, long, bright light red tubers. U. S. No. 1 grade yields have been on a par

with those of the highest yielding red varieties. Thus far virus X infection of the stock is very low, At times scab has been present to a serious extent though. It seems adapted to early regions. The specific gravity is high, the culinary quality is very good, but it is not promising for chips.

156.48-2X has been the very outstanding clone of the year because of very high yield of very good type tubers. The specific gravity is high and culinary quality is good. It does not seem good for chips. It seems adapted to a great range of conditions.

The second group of advance red selections consists of three selections with long smooth elliptical red tubers. The important aspects of these seem to be as follows:

215.50-2. Excellent type tubers, fair yields, sometimes small amount of hollow heart and scab susceptible. Culinary quality intermediate.

191.50-2. Similar to 215.50-2 but later and with somewhat smaller tubers which are sometimes immature. Culinary quality has been better.

131.50-2 has been the earliest and usually the most productive of this group with the highest percentage of U. S. No. 1 A-size tubers, which have usually been larger than with the two other selections, and hollow heart seems to have been less prevalent. The specific gravity and culinary quality have been intermediate to high, chip quality poor.

Status of White Scab-Resistant Nebraska Selections

Of a group of 6 white or russet scab-resistant selections only 2 are considered for immediate use. The others have certain serious commercial defects. These two selections are:

29.47-2. A medium late selection producing white tubers of the Menominee type though considerably smoother. U. S. No. 1 yields have been high especially on dryland. Scab lesions are always of the milder type. It is sufficiently scab resistant for all except the most severely infected soils. Proneness to hollow heart and growth cracking are the most serious defects. It is not suitable for early crop production. The culinary quality places it in the lowest group. It is being considered for 1957 release for use in special situations, especially for dryland culture.

223.48-1X is an early line producing uniformly roundish to oblong medium size russet tubers. It is highly resistant to scab. The yields make it competitive with the better varieties under practically all conditions. The interior color is fair, the culinary quality has fluctuated from fair to very good. This is largely due to the lack of good color in the cocked potatoes. It may be released to seed growers in 1957.

Early Gem was included in the tests because of the spurt of interest in this new variety. The scab resistance of this variety was found to be very high, but it seems very unsatisfactory for Nebraska because of non-competitive yields, very high percentages of growth-cracked rough, hollow potatoes of low specific gravity and very poor culinary quality.

Chip Tests

With summer-grown early potatoes (Hershey) that were held in cold storage and warmed at 70° F. for 6 weeks, commercially acceptable chips were made from tubers of Redbake and 82.49-1X. Barely acceptable were: 215.50-2, White Cloud, Early Gem, 315-48-3X.

With western Nebraska dryland (Box Butte) tubers kept warm continually, good to excellent chips were made from all of the varieties and selections except one minor selection. In these tests Redbake was one of the better varieties but Progress and Triumph were marginal.

Tubers from Scotts Bluff (irrigated) that were stored at variable ranges of 40° to 75° but at 75° for 3 to 7 weeks before chipping, the only selections that produced good chips were:

Chip rating

(9 = top, 7 min. acceptable)

77.51-2	9
181.51-2	7
226.49-1X	7
Redbake	6

Graying and Blackening of Raw Potato Slices

As a byproduct of chip tests empirical observations are made of the darkening of raw slices of all tubers being tested. Those of most varieties darken considerably. It appears to be less severe with potatoes that have never been chilled. After chilling there appears to be no improvement in the ability of raw slices not to darken. Among those that have darkened least and the modal rating of warm stored tubers are the following:

<u>Modal rating of whiteness (9 = white)</u>		<u>Modal rating of whiteness (9 = white)</u>	
29.47-2	7	156.51-2	7
83.49-1	7	332.51-1	8-
29.50-9	8	369.51-1	9-
191.50-1	8		

Heat Resistance

Heat tolerance testing of advance lines has been resumed by subjecting greenhouse-grown plants of uniform size to a stream of air of 133-135° F. for 4 hours and evaluating the extent of survival as observed 24 hours later. Clonal populations have been found to differ greatly as to their endurance. Some of the most heat-resistant lines observed in April 1956 were:

114.49-1X	226.49-1X
161.49-5X	82.49-1X
83.49-1	Early Gem
90.49-1X	

At the other extreme of lines whose tops were almost completely killed were:

Triumph
29.47-2
Progress
Cayuga
Red Pontiac
Dazoc

This phase is being continued.

Efforts are being made to ascertain the extent to which root/top ratios vary by lines and what relation they bear to heat endurance.

Project NC 35: Potato improvement through parental line breeding.

This North Central Regional Project has been described in the American Potato Journal, November 1956, by Rieman, Hooker, Krantz, and Werner. The Nebraska phase of the project will be concerned with the production of lines of increased homozygosity for scab and heat or drouth resistance. Robert O'Keefe is joining the staff of the Department of Horticulture on February 1 to work almost exclusively on this project. The report of Nebraska, concerning the status of our stocks, etc., has been referred to in the earlier portion of this report.

Table 1. Total yields of advanced selections and standard varieties, cwt. per acre, 1956 trials.

Variety or selection	Central	Western Nebraska - Irrigated				Western Nebraska-Dryland		
	Nebraska	Scotts Bluff	Station	Sioux	Sheridan	Box Butte	Farm	Banner
	Irrigated	Planted	Planted	County	County	Planted	Planted	County
	Cozad (3000')	June 19 (4000')	June 19 (4000')	"Dutch Flats" (4200')	"Mirage Flats" (3900')	June 19 (4000')	June 30 (4500')	(5300')
Red varieties developed in Nebraska								
Redbake	350	195	193	315	305	68.5	76.7	72.4
Dazoc	393	150	171	269	350	61.4	75.8	46.8
Sheridan	256	214	148	292	313	72.3	44.6	57.6
Redglo	423	266	249	329	365	85.6	69.6	71.7
Progress	393*	291	261	377	397	63.8	76.2	67.6
Red varieties - various origins								
Triumph		271	219	378	396	55.2	61.0	77.4
Lasoda	399	259	294	348	382	93.8	68.9	75.0
R.Pontiac	403	346	293	404	369	96.4	76.3	77.0
Advanced Nebraska red selections								
156.48-2X	478	355	307	508	491	91.7	116.0	104.3
315.48-3X	399	328	271	385	391	91.2	85.0	85.3
82.49-1X	311	281	204	396	357	78.4	75.5	66.0
131.50-2	333	288	212	305	277	94.5	70.8	56.5
191.50-1	303	276	203	290	275	72.6	57.1	69.5
215.50-2	356	223	154	253	263	77.9	54.4	53.1
White scab resistant lines								
Early Gem	336	203	172	263	341	49.4	38.0	49.4
29.47-2	354	325	223	409	326	89.3	77.8	80.4
223.48-1X		298	210	351	359	66.7	91.0	69.0

*Red Warba at Cozad instead of Progress.

Table 2. Yield as cwt. per acre - of U.S. #1 grade-A-size tubers, 1956 trials.

Variety or selection	Central	Western Nebraska - Irrigated				Western Nebraska-Dryland		
	Nebraska	Scotts Bluff	Station	Sioux	Sheridan	Box Butte	Farm	Banner
	Irrigated	Planted	Planted	County	County	Planted	Planted	County
	Cozad (3000')	June 19 (4000')	June 29 (4000')	"Dutch Flats" (4200')	"Mirage Flats" (3900')	June 19 (4000')	June 30 (4500')	(5300')
Red varieties developed in Nebraska								
Redbake	335	172	167	238	259	53.1	37.4	57.3
Dazoc	334	116	111	201	299	35.0	24.5	34.0
Sheridan	318	180	112	241	232	43.3	23.0	34.1
Redglo	399.6	232	203	190	277	43.9	40.4	48.3
Progress	231*	224	212	309	320	21.7	37.3	46.4
Red varieties - various origins								
Triumph		179	141	207	293	34.2	30.5	44.9
Lasoda	356	205	249	258	333	57.6	49.4	69.2
R.Pontiac	363	252	271	273	269	66.5	46.1	59.1
Advanced Nebraska red selections								
156.48-2X	455	303	268	450	402	69.7	83.1	90.0
315.48-3X	361	257	190	246	315	66.6	53.3	52.8
82.49-1X	280	246	171	300	286	47.5	49.1	53.0
131.50-2	290	252	183	264	215	71.5	41.9	40.2
191.50-1	245	230	148	222	199	32.9	26.6	42.6
215.50-2	310	181	104	176	190	61.6	20.0	30.8
White scab resistant lines								
Early Gem	257	159	144	194	294	36.4	22.0	40.5
29.47-2	302	274	190	337	218	65.1	54.4	68.7
223.48-1X	359	249	173	304	318	53.5	76.6	37.0

*Red Warba at Cozad instead of Progress.

Table 3. Per cent U.S. #1-A size tubers, 1956 trials

Variety or selection	Central	Western Nebraska - Irrigated				Western Nebraska-Dryland		
	Nebraska	Scotts Bluff	Station	Sioux	Sheridan	Box Butte Farm	Banner	
	Irrigated	Planted	Planted	County	County	Planted	Planted	County
	Cozad (3000')	June 19 (4000')	June 29 (4000')	"Dutch Flats" (4200')	"Mirage Flats" (3900')	June 19 (4000')	June 30 (4500')	(5300')
Red varieties developed in Nebraska								
Redbake	95.8	88.1	86.5	75.4	84.9	77.5	48.7	79.2
Dazoc	85.0	77.7	65.1	74.6	85.4	57.0	32.3	72.8
Sheridan	90.3	83.9	75.4	82.3	74.1	59.9	51.6	59.1
Redglo	94.5	87.1	81.4	57.8	75.9	51.3	58.0	67.3
Progress	71.2*	76.9	81.2	82.0	80.6	34.1	49.0	68.7
Red varieties - various origins								
Triumph		66.0	64.4	54.9	74.0	62.0	50.0	58.1
Lasoda	89.2	79.2	84.6	74.3	87.2	61.4	71.7	92.2
R.Pontiac	90.0	73.0	86.0	74.4	77.6	69.0	60.4	76.7
Advanced Nebraska red selections								
156.48-2X	95.2	85.3	87.2	88.5	81.9	76.0	71.7	86.2
315.48-3X	90.4	78.4	70.1	63.9	80.5	73.0	68.9	61.9
82.49-1X	89.9	87.7	83.7	75.9	80.0	60.6	65.0	80.4
131.50-2	85.7	87.6	86.3	86.6	77.7	75.6	59.2	71.1
191.50-1	80.7	83.2	72.7	76.7	72.4	45.2	46.6	61.2
215.50-2	87.1	81.2	67.9	69.6	72.1	79.0	36.7	58.0
White scab resistant lines								
Early Gem	76.4	78.3	83.4	73.7	86.1	73.7	57.9	82.0
29.47-2	85.3	84.4	85.0	82.4	67.0	72.9	70.0	85.4
223.48-1X	94.9	83.7	82.4	86.6	88.5	80.1	84.2	53.6

*Red Warba at Cozad instead of Progress.

Table 4. Mean specific gravity of tubers in 1956 trials,
and per cent hollow-heart in two trials.

Variety or selection	Central	Western Nebraska	Nebraska - Irrigated			Western Nebr.-Dryland			Irrigated plats hollow heart - per cent of #1 grade A-size tubers. Sioux Sheridan Co. Co.	
	Nebraska	Scotts Bluff	Station	Sioux	Sheridan	Box Butte Farm	Banner			
	Irrigated	Planted	Planted	County	County	Planted	Planted	County		
	Cozad (3000')	June 19 (4000')	June 29 (4000')	"Dutch Flats" (4200')	"Mirage Flats" (3900')	June 19 (4000')	June 30 (4500')	(5300')		
Red varieties developed in Nebraska										
Redbake	77.5	86.3	94	87	80	94.1	99.7	88.7	2.3	0
Dazoc	69.8	76.0	82	84	73	90.0	93.8	83.7	5.7	5.7
Sheridan	73.5	81.7	83	82	75	96.3	91.3	86.7	0	0
Redglo	65.2	86.0	82	79	77	88.8	85.4	79.7	0	0
Progress	65.3*	77.0	82	78	75	84.9	91.7	85.7	0	0
Red varieties - various origins										
Triumph		76.7	74	81	72	81.0	86.8	84.3	0	1.0
Lasoda	66.0	79.3	85	78	75	94.5	90.8	87.0	2.1	2.5
R.Pontiac	65.2	76.7	82	71	67	82.2	85.0	76.7	9.5	1.6
Advanced Nebraska red selections										
156.48-2X	77.0	82.3	90	83	81	93.0	96.7	90.0	0	0
315.48-3X	74.5	90.7	93	82	77	96.0	98.7	94.7	0	4.5
82.49-1X	83.5	90.7	95	86	76	102.7	100.0	98.3	5.6	2.1
131.50-2	77.0	84.3	88	78	67	95.8	98.3	89.0	0	3.0
191.50-1	79.8	96.1	93	88	82	104.7	98.7	100.7	6.9	4.0
215.50-2	81.8	90.7	92	89	73	97.7	99.7	89.7	7.6	9.6
White scab resistant lines										
Early Gem	64.5	73.0	82	79	68	71.2	80.7	82.7	10.0	0
29.47-2	66.5	87.3	88	76	73	98.3	93.0	88.7	8.5	6.2
223.48-1X	71.8	83.3	93	85	75	95.1	92.6	88.0	3.7	8.5

*Red Warba at Cozad instead of Progress.

Table 5. A-size scabby tubers - as per cent of total yield, 1956 trials.

Variety or selection	Central	Western Nebraska - Irrigated				Western Nebraska-Dryland		
	Nebraska	Scotts Bluff	Station	Sioux	Sheridan	Box Butte	Farm	Banner
	<u>Irrigated</u>	Planted	Planted	County	County	Planted	Planted	County
	Cozad (3000')	June 19 (4000')	June 29 (4000')	"Dutch Flats" (4200')	"Mirage Flats" (3900')	June 19 (4000')	June 30 (4500')	(5300')
Red varieties developed in Nebraska								
Redbake	0	1.8	0	13.1	.7	8.4	2.7	.4
Dazoc	0	3.0	6.2	7.3	1.5	14.5	44.5	1.1
Sheridan	0	5.7	3.1	9.4	3.4	20.7	14.7	9.0
Redglo	0	2.4	2.0	32.4	2.5	15.7	10.6	2.0
Progress	0*	.8	1.0	4.3	2.1	5.6	10.8	.3
Red varieties - various origins								
Triumph	0	5.3	4.0	13.5	2.2	6.3	7.0	3.3
Lasoda	0	7.0	4.6	11.3	.5	23.2	7.9	.5
R.Pontiac	0	2.0	1.0	7.6	1.7	21.8	14.3	8.9
Advanced Nebraska red selections								
156.48-2X	0	3.0	1.1	2.3	.7	11.2	10.1	1.5
315.48-3X	0	5.4	4.7	3.4	1.9	13.3	14.8	14.1
82.49-1X	0	0	1.9	14.4	1.0	15.8	14.3	.3
131.50-2	0	.5	1.3	3.1	.5	16.0	4.4	11.8
191.50-1	0	2.1	2.2	9.6	2.8	7.2	11.2	1.1
215.50-2	0	0	1.8	17.7	8.3	6.3	22.8	13.2
White scab resistant lines								
Early Gem	0	0	0	0	2.8	3.3	0	0
29.47-2	0	0	.3	0	10.6	5.6	6.0	.5
223.48-1X	0	.6	0	.4	4.7	0	1.6	0

*Red Warba at Cozad instead of Progress.

Table 6. A-size rough potatoes - (knobs, growth cracks, etc.)
as per cent of total yield

Variety or selection	Central	Western Nebraska - Irrigated				Western Nebraska-Dryland		
	Nebraska	Scotts Bluff	Station	Sioux	Sheridan	Box Butte	Farm	Banner
	<u>Irrigated</u>	Planted	Planted	County	County	Planted	Planted	County
	Cozad (3000')	June 19 (4000')	June 29 (4000')	"Dutch Flats" (4200')	"Mirage Flats" (3900')	June 19 (4000')	June 30 (4500')	(5300')
Red varieties developed in Nebraska								
Redbake	.5	0	1.8	.5	.5	1.1	0	0
Dazoc	5.9	6.2	5.7	3.1	3.1	4.2	2.8	2.6
Sheridan	3.3	3.1	1.5	2.3	2.3	.4	0	.7
Redglo	2.9	2.0	1.2	3.5	3.5	0	0	0
Progress	14.8	1.0	5.9	3.9	3.9	0	.7	2.7
Red varieties - various origins								
Triumph	1.3	4.0	12.3	8.5	8.5	1.3	2.6	1.2
Lasoda	7.6	4.6	5.0	5.6	5.6	1.7	1.3	0
R.Pontiac	19.4	.5	18.2	11.4	11.4	1.1	2.8	2.0
Advanced Nebraska red selections								
156.48-2X	5.7	1.1	3.4	.7	.7	0	1.4	0
315.48-3X	6.9	4.7	16.2	1.9	1.9	2.4	2.6	.3
82.49-1X	2.0	1.9	1.4	1.0	1.0	1.3	0	.3
131.50-2	5.1	1.3	.7	.5	.5	0	1.9	0
191.50-1	1.4	2.2	3.4	2.8	2.8	0	0	0
215.50-2	8.5	1.8	5.1	8.3	8.3	0	0	0
White scab resistant lines								
Early Gem	12.2	0	10.7	2.8	2.8	4.1	25.6	3.6
29.47-2	7.1	.3	11.0	10.6	10.6	4.4	.5	1.3
223.48-1X	3.4	0	4.6	4.7	4.7	3.0	1.3	4.1

*Red Warba at Cozad instead of Progress.

Table 7a. Mean estimates of various aspects of varieties and advanced selections in three panel-judged cooking trials.

Variety or selection	A. Western Nebraska 1955 late crop (4 tests, 4 judges)							
	1. Scotts Bluff (irrigated)				2. Banner County (dryland)			
	Texture (50)	Color (20)	Flavor (30)	General (100)	Texture (50)	Color (20)	Flavor (30)	General (100)
Red varieties developed in Nebraska								
Redbake	37.56	15.56	21.56	74.69	42.13	13.12	24.38	79.63
Sheridan	37.31	16.81	21.69	75.81	39.25	15.69	22.38	77.31
Dazoc	33.94	17.81	21.19	72.94	38.38	14.37	22.38	75.13
Progress	24.13	16.00	18.37	58.50	33.19	15.25	20.31	68.75
Redglo	27.75	16.50	19.81	64.06	33.13	15.31	20.88	69.32
Red varieties from other sources								
Red Warba	33.00	17.00	19.69	69.69	39.00	16.37	23.38	78.75
Triumph	30.50	16.69	19.00	66.19	32.06	14.56	20.25	66.87
Lasoda	32.69	15.06	20.06	67.81	39.13	15.13	24.19	77.81
R.Pontiac	22.94	16.25	16.69	55.88	28.63	14.81	18.50	61.94
Advanced red Nebraska selections								
93.48-1	40.13	18.56	25.25	83.94	35.31	13.50	21.94	70.75
95.48-1	33.88	16.13	21.31	71.19	35.81	11.81	20.38	68.00
82.49-1X	34.63	15.06	22.37	72.38	42.19	15.12	25.19	82.50
215.50-2	37.31	13.38	20.56	71.25	39.69	12.94	23.06	75.69
White varieties and white scab resistant Nebraska selections								
W. Cloud	38.62	18.06	22.75	79.44	40.37	13.94	22.75	77.06
Cayuga	34.31	15.38	21.19	70.88	40.81	14.56	24.56	79.94
29.47-2	31.44	17.06	20.56	69.06	35.25	15.69	21.75	72.69
223.48-1X	30.25	13.19	18.88	62.31	34.81	11.75	20.69	67.25
L.S.D.	1.60	.70	2.39	6.56	1.60	.70	2.39	6.56

Table 7b. Mean estimates of various aspects of varieties and advanced selections in three panel-judged cooking trials.

Variety or selection	B. Central Neb. summer crop 1956 (Hershey) (4 tests, 4 judges)					Western Neb. late 1956. (Scotts Bluff) (irrigated) (6 tests, 6 judges)				
	Color					Color				
	Texture (40)	First (20)	Stand (15)	Flavor (25)	General (100)	Texture (45)	First (20)	Stand (15)	Flavor (20)	General (100)
Red varieties developed in Nebraska										
Redbake	34.78	16.17	12.61	21.39	84.94	40.89	17.31	12.86	16.92	87.97
Sheridan	27.67	15.39	12.00	18.67	73.72	33.14	16.36	12.28	14.61	76.39
Dazoc	31.00	15.33	11.50	21.00	77.89	30.53	16.61	11.94	13.89	72.97
Progress						34.61	17.19	12.56	14.83	79.19
Redglo	24.44	14.28	10.33	16.72	65.77					
Red varieties from other sources										
Red Warba	27.44	15.11	11.17	18.33	72.05					
Lasoda	25.72	13.50	10.50	15.56	65.28	34.22	14.31	10.08	14.44	73.06
R.Pontiac	28.50	14.11	10.61	17.89	71.11	35.89	16.94	12.42	15.31	80.53
Redburt	27.67	16.33	12.11	17.67	73.78					
Red Beauty	29.17	14.33	11.39	19.39	74.33					
Redkote	29.78	16.28	11.94	20.06	78.05					
Advanced red Nebraska selections										
93.48-1	34.22	16.72	11.67	21.06	83.67	38.08	16.83	12.08	16.19	83.19
95.48-1	29.17	14.61	12.00	18.89	74.55					
156.48-2X	30.39	16.66	12.17	18.28	77.50	35.72	16.75	12.06	14.47	79.00
315.48-3X	36.22	17.22	13.33	22.72	89.44	40.89	17.44	12.78	17.64	88.75
82.49-1X	36.44	17.61	13.44	20.94	88.44	31.50	16.53	11.83	13.97	73.83
131.50-2	33.44	16.00	11.28	21.56	82.28	33.31	16.47	11.72	13.89	75.39
191.50-1	36.22	16.94	12.89	21.83	87.94	36.81	16.81	11.97	15.67	81.26
215.50-2	31.17	13.11	9.94	18.94	73.17	37.58	15.14	11.56	15.58	79.86
White varieties and white scab resistant Nebraska selections										
W. Cloud	31.33	14.22	10.44	18.44	74.44					
Early Gem	25.83	13.83	10.33	17.22	67.22					
29.47-2	26.67	14.71	10.28	17.56	69.28	29.75	13.39	9.44	12.36	64.94
223.48-1X	33.22	16.22	12.06	20.78	82.28	39.50	16.89	12.53	16.56	85.50
L.S.D.	2.59	1.55	.56	1.98	3.02	Statistical analysis not completed				

NEW HAMPSHIRE
Paul T. Blood

Twenty-four seedlings and varieties were grown in a yield test at Northwood, N. H., on Paxton soil, with approximately 1600 pounds of an 8-12-12 fertilizer applied per acre. This test was planted May 21, and harvested October 6, 1956. Each plot consisted of 2 rows, 20 feet long, planted within a randomized block and replicated 4 times. The seed spacing was 10 inches for old varieties.

The samples for the chipping test were removed from 40° F. storage 2 weeks before chipping and held at 80-90° F. for conditioning. Frying temperatures started at 375° F. Cottonseed oil was used as a frying medium.

The crop suffered from drought in August. The coolest summer on record was apparently responsible for the high solids content this year. The yields, total solids, and chip ratings are given in N. H. table 1. Six varieties produced over 500 bushels per acre of tubers over 2 inches minimum for size. Kennebec F451, and Sport #10 were the only selections judged as excellent in the chipping test.

N. H. table 1.--Yield, total solids, and chipping quality of 24 potato varieties grown at Northwood, N. H., 1955.

Variety	Yield per acre		Total solids	Chip color rating ^{2/}
	Over 2"	Under 2"		
	Bu. 1/	Bu.	Pct.	
Green Mountain	577	33	21.3	P
Canoga	555	42	21.8	P
Saco	535	37	21.9	F
Russet	531	34	22.0	G
46125	516	38	21.6	G
Kennebec	504	27	21.5	E
Teton	495	25	20.1	P
Sport #10	492	15	21.5	E
Chippewa	476	27	19.3	F
Delus	469	10	22.6	F
Plymouth	458	19	20.0	P
Merrimack	437	34	23.0	G
Canso	436	25	21.6	F
F451	429	50	22.1	E
Keswick	428	13	21.3	P
Katahdin	424	18	20.2	F
B932-9	402	71	24.0	G
Manota	378	58	21.8	G
B 621-16	374	17	20.2	P
Early Gem	341	32	19.6	G
Cherokee	340	34	20.9	P
B 605-10	326	38	22.7	P
Irish Cobbler	301	69	21.8	F
B 962-3	275	44	21.5	P

1/ L.S.D. .05 - 22 bu. per acre

2/ Chip ratings: E, excellent; G, good; F, fair; P, poor.

NEW JERSEY
John C. Campbell

Four potato variety trials were conducted at 4 locations by the New Jersey Agricultural Experiment Station in 1956.

Test with Seabrook Farms Company, Elmer, N. J.,
Coombs and Sons Farms.

The data in N. J. table 1 presents yields of 305 and 316 bushels of U. S. No. 1 tubers per acre for Saco and Plymouth, the two highest yielders. Also, Saco, Cherokee, Delus, and seedling B 73-3 had total solid ratings of 18.7 percent. Late blight was severe on this farm in 1956. The late-blight-resistant varieties were eventually killed, and some of the resistant ones showed tuber blight rot.

Test at Freehold, N. J., Ketcham Brothers Farm

In N. J. table 2 the results are given for 20 selections tested at Freehold. Plymouth heads the list for production, with a yield of 733 bushels of U. S. No. 1 potatoes per acre, followed by Saco, Red LaSoda, Chippewa, White Cloud, Pungo, Dazoc and Katahdin, with yields of 500 bushels or more per acre. Russet Burbank had a total yield of 604 bushels per acre, but it graded out only 56 percent of U. S. No. 1 tubers. Total solids of 18.4 percent each for Merrimack, and Delus were the two highest from these lots.

Test at Cranbury, N. J., Simonson Brothers Farm

The results presented in N. J. table 3 show yields of 552 bushels per acre of U. S. No. 1's for Red LaSoda, 480 for Saco, 567 for Dazoc, 571 for Merrimack, and 520 for Irish Cobbler. Saco, Merrimack, Irish Cobbler, and Pungo were high in percentages of total solids.

Test at New Brunswick, N.J., Vegetable Research Farm

The results of these trials are found in N. J. table 4. In all comparisons the yield for irrigated plots were greater than those for the unirrigated. Increases in yield due to irrigation varied widely and some selections responded more than others to irrigation. Highest variety yields of U. S. No. 1 tubers per acre for Saco, Katahdin, Dazoc, Manota, Redkote, and Redburt were 468, 464, 457, 448, 412, and 411 bushels from the plots irrigated twice, and only 286, 350, 282, 328, 239, and 279, respectively, for the unirrigated ones. In 13 comparisons the irrigated lots were higher in percentages of total solids than the unirrigated areas, and in 9 comparisons the unirrigated were the highest. Apparently irrigation does not have an overall effect of increasing total solids. Tuber samples from plots of Delus, B 73-3, B 69-16, Manota, Plymouth, Merrimack, and B 595-76 had very acceptable percentages of total solids of 20.7, 19.4, 19.2, 18.5, 18.4, 18.4, and 18.2, respectively, when they received irrigation.

N. J. table 1.--Potato variety test 1956, in cooperation with Seabrook Farms Company.

Variety	Source	Yield per acre 1/					B's	Remarks
		Total	U. S. 1	U. S. 1	Dry matter			
		Bu.	Bu.	Pct.	Pct.	Pct.		
Cobbler	Maine	280	221	79	15	16.9		1.5% growth cracks
Redburt***	Minn.	268	228	85	4	15.0		6% late blight rot, 3% knobby & growth cracks
Osage	Minn.	166	154	93	3.5	16.8		2% growth cracks, 1% knobby, 1.5% late blight rot.
Sebago	P.E.I.	244	207	85	10.0	16.7		1% knobby, 1.5% l.blight rot.
White Cloud	Nebr.	249	182	73	21.0	16.7		3% scabby
Dazoc	Nebr.	263	163	72	18	15.5		2% scabby & 2% late blight
Saco	USDA	339	305	90	4.5	18.7		3% growth cracks
Waseca**	Minn.	297	235	79	12	15.3		6% scabby
Canso	Maine	247	205	83	14	16.9		1.5% late blight rot
Red Beauty*	Wisc.	215	168	78	11	15.7		6% growth cracks & scab
Merrimack	USDA	205	174	85	8	16.9		4% knobby, 2% soft rot
R.Burbank**	Maine	211	167	79	13	18.1		8% knobby & growth cracks
Redbake**	Nebr.	229	181	79	13	16.7		2.5% blight rot
Cherokee	Maine	249	214	86	10.5	18.7		1.5% knobby
Red LaSoda	Wisc.	301	244	81	10	15.7		3% growth cracks & scab, 4% late blight rot
R.Rural	Maine	209	157***	75	20			No off grades
Plymouth	USDA	333	310	93	5			1.5% off shape & growth cracks
Keswick*	USDA	235	204	87	9	17.9		No off grades
Manota	USDA	272	237	87	10	16.7		- - - - -
Delus	USDA	256	225	88	9	18.7		Large tubers
Red Warba*	Minn.	267	190	71	16	15.3		5% scabby & knobby, 1% late blight rot
B 73-3*	USDA	220	185	84	5	18.7		2% blight rot, 7% bacterial rots.
B 69-16*	USDA	295	248	84	7.5	16.7		1% knobby, 1.5% l.blight rot

1/ Yields are average of 3, 50-foot row plots, except as noted below.

2/ 1 3/4" min. tubers long and slender

* One plot only

** Average of 2 plots

*** Average of 4 plots

1 ton 7-14-7 (3% mag.). All potash from sulfate of potash. Seed spaced 9-10 inches. Irrigated twice. pH 5.5 - 6.0. Geo. Coombs and Son, Elmer. Planted June 26, 1956. Harvested October 26, 1956.

N. J. table 2.--Potato variety test, 1956, Ketcham Brothers, Freehold.

Variety	Source	Yield per acre *			B's	Dry matter	Remarks
		Total	U. S. 1	U. S. 1			
		Bu.	Bu.	Pct.	Pct.	Pct.	
Plymouth	USDA	764	733	96	3	17.4	
Saco	USDA	729	532	73	6	17.7	5% knobby and scab
Red LaSoda	Wisc.	702	519	74	3	15.7	22% scabby and knobby
Chippewa	Maine	611	507	83	6	13.9	9% scabby
R. Burbank***	Maine	604	338	56	5	16.5	35% knobby
White Cloud	Nebr.	593	551	93	6	16.7	Round tubers
Pungo	Maine	552	519	94	5	17.2	Large tubers, rough skin
Dazoc	Nebr.	524	461	88	9	16.2	1.5% knobby
Katahdin	Maine	514	488	95	4.5	14.6	Good shape
Canso	Maine	510	449	88	4.5	16.2	6.5% growth cracks
I. Cobbler	Maine	492	428	87	7	15.5	4% knobby
S-50.4-52-40	Minn.	474	384	81	5	15.0	12.5% growth cracks
Katahdin**	N. J.	472	425	90	6	14.3	2% scab
Redkote	Minn.	454	372	82	12.5	14.6	2% growth cracks
Redburt	Minn.	450	360	80	7.5	14.0	11.0% scab and knobby
Merrimack	USDA	446	414	93	5	18.4	Long type tubers
Cherokee	USDA	446	334	75	9	17.2	12% knobby
Pontiac	Del.	418	334	80	13	14.1	2% knobby
Delus	USDA	332	312	94	4	18.4	1% knobby
Osage	Minn.	216	192	89	8	15.5	10% scab, growth cracks

* Average 3 plots each 32 feet long and two rows wide.

** Seed from 1955, N. J. Commercial crop.

*** U. S. No. 1 over 1 3/4" because tubers are long and slender

2000 lbs. 7-14-14 at planting. Irrigated twice. Seed all spaced 10 inches. Planted May, 1956. Harvested, October 10, 1956.

N. J. table 3.--Potato variety test, 1956, Simonson Brothers, Cranbury.

Variety	Source	Yield per acre ^{1/}			B's	Dry matter	Remarks
		Total	U. S. 1	U. S. 1			
		Bu.	Bu.	Pct.	Pct.	Pct.	
Red LaSoda	Wis.	681	552	81	6	16.2	High yield, 12% scabby
Saco	USDA	657	480	73	3	18.4	Scab & blight res.; knobby, 23%; very thin skin
Dazoc (red)	Nebr.	616	567	92	6.0	16.9	Good red color, 0.8% scab & knobby.
Merrimack	Maine	601	571	95	3	18.9	Blight res.; knobby growth cracks, 2%.

continued

N. J. table 3, continued.

Variety	Source	Yield per acre/					Dry matter	Remarks
		Total	U. S. I	U. S. I	B's			
		Bu.	Bu.	Pct.	Pct.	Pct.		
I. Cobbler	Maine	571	520	91	7	18.2		Early, 1% off-shape, & black leg
R. Burbank	"	558	452*	81	5	17.9		Good quality, 3% knobby
Katahdin	"	555	527	95	2.3	16.7		Mild mosaic res., large tubers
Redburt	Minn.	547	481	88	7	14.6		3% knobby
Plymouth	USDA	545	523	96	2	16.7		Scab & blight res., 1.6% growth cracks, & knobby
Cherokee	Maine	530	451	85	7.0	17.7		Scab & blight res., 6% knobby
White Cloud	Nebr.	517	491	95	4.3	16.7		Good shape, white flesh, tubers round, med.-size
Redkote	N. Dak.	503	448	89	4	16.0		Scab-resistant, growth cracks 4%
Pungo	Maine	500	465	93	5	18.4		Blight & scab res., skin slightly russeted.
Red Beauty	Wis.	493	429	87	8	16.7		Verticillium wilt res., 2% knobby & growth cracks
Katahdin**	N. J.	458	417	91	6	16.7		Slight fusarium rot
Delus	USDA	453	381	84	1	20.2		Knobby, 15% growth cracks, fusarium rot
Canso	Maine	442	398	90	6	17.4		Blight-res., 3% fusarium dry rot
S50-4-52-40(red)	Minn.	438	377	86	12	16.0		Dark red, rough skin
Sebago	Del.	422	362	86	9	15.5		Blight res., tubers large, 2% fusarium dry rot
Osage	Minn.	311	215	69	5	16.0		Scab res., 24% shallow scab

1/ Yields equal average of 6 plots

* Graded over 1 3/4" screen because tubers were long and slender

** Seed from 1955 New Jersey commercial crop

2,300 lbs. 5-10-10 at planting. Irrigated twice. Seed all spaced 10 inches. Planted April 13, 1956. Harvested October 3, 1956.

N. J. table 4.--Yield and total solids of irrigated and unirrigated potato varieties at the Vegetable Research Farm, New Brunswick, N. J.

Variety	Source	Method	Yield per acre					Remarks
			Total	U. S. I	U. S. I	B size	Solids	
			Bu.	Bu.	Pct.	Pct.	Pct.	
White Cloud	Nebr.	I	410*	376	91	6	16.9	1.5% scab & 1.5%knobby
		U	301*	250	83	10	17.2	5% scabby
Merrimack	Maine	I	358*	336	94	4	18.4	1% knobby
		U	252*	227	90	7	17.7	2.5%knobby &2% growth cracks.

continued

N. J. table 4, continued.

Variety	Source	Method	Yield per acre				B size	Solids	Remarks
			Total	U. S. No. 1	U. S. No. 1				
			Bu.	Bu.	Pct.	Pct.	Pct.		
I. Cobbler	Maine	I	376*	353	94	4	17.2		Trace of soft rot
		U	336*	317	94	5	17.7		" " " "
Plymouth	USDA	I	327*	308	94	4	18.4		" " off-shape
		U	297*	287	97	3	17.9		
R. Burbank	USDA	I	275*	211	77	9	16.9		11% knobby
		U	247*	151	61	14	17.4		21% " & dumbbell type
Delus	USDA	I	347*	340	98	1	20.7		Tubers very large
		U	286*	274	96	2	18.9		" " " & knobby
B2368-4	USDA	I	302*	263	88	6	15.7		2% growth cracks & deep eyes
		U	279*	246	88	4	16.7		6% growth cracks
B 595-76	USDA	I	354*	305	86	6	18.2		5% " " & 1% knobby
		U	241*	219	91	6	17.9		2% growth cracks
Saco	USDA	I	530*	468	86	3	17.9		10% knobby
		U	371*	286	77	7	17.2		13% "
Katahdin	Maine	I	480*	464	97	3	16.9		no off-grades
		U	368*	350	95	4	16.2		" " "
B926-9	USDA	I	427*	386	90	6	15.3		2% growth cracks & 2% knobby.
		U	335**	305	91	7	15.5		
Pungo	Maine	I	336**	301	90	7	17.7		2% growth cracks
		U	287**	257	90	8	17.4		1% knobby & growth cracks
Canso	Maine	I	363**	350	97	2	17.2		Tubers large
		U	310**	288	93	5	17.4		" "
Redkote	N. D.	I	461**	412	92	5			2% off-shape
		U	277**	239	92	6	15.3		1% " "
Dazoc	Nebr.	I	528**	457	87	6	17.7		5% scabby
		U	330**	282	86	7	16.7		2% growth cracks & 4% scabby
Cherokee	Maine	I	330**	300	91	6	17.4		2% growth cracks
		U	211**	174	83	13	17.2		2% knobby
X 96-56	USDA	I	342**	294	86	4			10% "
		U	253**	234	93	5			1% "
B 73-3	USDA	I	253**	226	90	5	19.4		3% "
		U	202**	181	90	7	18.2		2% "
Manota	N. D.	I	448**	399	89	7	16.6		3% "
		U	328**	284	87	10	18.5		2% "
Osage	Minn.	I	301**	292	97	2	16.0		Trace of hollow heart
		U	202**	196	97	2	16.9		" " growth cracks
Redburt	Minn.	I	442**	411	93	5	17.2		" " scab
		U	328**	279	85	8	16.9		2% scab & 1% knobby
Sheridan	Nebr.	I	365**	292	80	15	16.9		Trace of scab
		U	281**	218	76	17	16.9		

continued

N. J. table 4, continued.

Variety	Source	Method	Yield per acre			B size	Solids	Remarks
			Total	U. S. No. 1	U. S. No. 1			
			Bu.	Bu.	Pct.			
Boone	USDA	I	258**	233	90	8	14.6	Trace of off-shape
		U	193**	167	87	9	15.3	" " " "
Keswick	USDA	I	271**	254	94	6	17.2	
		U	211**	194	92	8	16.9	
B 69-16	USDA	I	411**	386	94	5	19.2	Trace of soft rot
		U	200**	167	84	12	16.2	Trace of knobby

I/ I, irrigated; U, unirrigated.

* Average yield of 2 replications

** Average yield of 2 replications

2,300 pounds 5-10-10 fertilizer used. Seed spaced 10 inches in 36-inch rows. Half of each variety irrigated twice. Planted, April 25, 1956. Harvested, October 28 - 30, 1956.

Potato Dipping Test

The varieties producing the high-test colored chips in the fry test shortly after harvest were Osage, Dazoc, White Cloud, Russet Burbank, and Sebago. The darkest colored chips in these tests were made from Red Beauty, Redburt, Pontiac, Red LaSoda, and Chippewa. Delus and Saco produced chips ranging in color from light to medium dark brown.

NEW YORK

R. Kunkel, R. L. Sawyer and Ora Smith

Potato variety trials were completed in 7 counties of New York State in cooperation with the respective County Agricultural Agents.

Seed was obtained from the U.S.D.A. station at Presque Isle, Maine, for all varieties except Osseo which came from Wisconsin. The grower's variety was included in each trial.

Each experiment consisted of 4 randomized blocks. The plots were single rows, 30 feet long, except in Suffolk County where the plots were 50 feet long. The seedpieces were spaced 9 inches apart in the row. The fertilizer, planting dates, cultural practices and harvest dates were those of the grower except in Suffolk County where the trial was on the Long Island Vegetable Research Farm.

Specific gravity determinations were made with the potato hydrometer on a sample from each of the 4 replications.

Potato chip color readings were made with a Hunter Color Difference Meter, made by the Gardner Laboratory. Values higher than 16 are considered acceptable. Single samples were tested except in Wyoming and Cortland Counties where 4 and 3 replications, respectively, were tested to study the variability.

Results and Discussion - Long Island, Suffolk County Plot. The growing season of 1956, particularly the maturing season, was relatively cool. Consequently, this was not a good season for screening out varieties for heat defects. N.Y. table 1-5 gives the pertinent information on the varieties. Specific gravities were much higher than usual for Long-Island-grown Cobbler, Katahdin and Green Mountain which are used as comparisons for new introductions.

Plymouth may have some merit as an early variety to take the place of Cobbler. It was similar in quality and yield and had a much better shape than Cobber.

None of the varieties approached Green Mountain in quality as measured by specific gravity. Due to the cool maturing conditions, Green Mountain was much smoother looking than in a normal season.

Merrimack and Delus both had better internal quality than Katahdin, but yielded about 150 bushels of graded U. S. No. 1 tubers less per acre. In a cool maturing season such as 1956, Katahdin still stands out from all other varieties in an overall evaluation of shape, yield and quality if one considers eye appeal as an important point of quality.

Russet Burbank was included in most of the field work this year in an attempt to find out if it can be grown satisfactorily on Long Island. Factors under consideration were spacing, planting date, harvest date, fertilization and pH. Russet Burbank looked very promising in some of the plots this year.

Additional testing during hot seasons will be needed before a final evaluation can be made. Even though Russet Burbank may not be satisfactory for table stock, it might fulfill the need for a good chipping potato.

Results and Discussion of Up-State New York Trials. The results for total yield, specific gravity, percent dry matter and chip color are self-explanatory. The results presented for percentage grade need clarification.

Several varieties showed tendencies to growth crack. In several of these the cracks were relatively smooth and well healed and would not cause a paring waste exceeding U. S. No. 1 grade tolerance. Early Gem was particularly susceptible to growth cracking. Other varieties which showed strong tendencies to growth crack were B 2368-4, B 926-9, Plymouth, B 595-76, Delus, and Russet Rural.

At a number of locations Plymouth showed a tendency toward an unattractive shallow surface checking.

Saco and B 2368-4 produced large yields, but the tubers were rough and irregular in shape.

In 2 trials 10 tubers in each plot were cut for hollow heart. The average percentage of tubers showing hollow heart in the 2 trials was:

	%		%
Irish Cobbler	12.8	Early Gem	7.3
Plymouth	12.8	Katahdin	1.5
Delus	10.0	B 2368-4	15.7
Saco	2.9	Green Mountain	0.0
Merrimack	1.5	B 595-76	5.7
B 926-9	1.5	Sebago	0.0
Russet Rural	5.7		

The classification for season of maturity used in the table is that for Suffolk County, Long Island. In Up-State New York B 2368-4 and Saco appear to belong with the late group and B 926-9 with the mid season and, perhaps, even the early group.

N. Y. table 1.--New York State potato variety trials, 1956.

Variety	Total yield per acre and Counties where grown						
	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks
EARLY							
Irish Cobbler	341	333	297	282	156	348	474
Early Gem	355	257	276	251	158	325	431
Osseo	272	-	-	-	-	-	-
Keswick	297	-	-	-	-	-	-
Plymouth	358	362	379	292	200	371	512

continued

N. Y. table 1, continued.

Variety	Total yield per acre and Counties where grown						
	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks	100-lb. sacks
<u>MID-SEASON</u>							
Katahdin	379	316	323	292	196	392	567
Delus	292	262	282	338	189	279	483
B 2368-4 (Red)	380	345	343	374	-	334	611
Saco	400	392	379	415	235	467	622
<u>LATE</u>							
Green Mountain	402	310	271	410	312	371	626
Merrimack	295	228	241	302	184	264	419
B 926-9	359	332	302	323	195	401	485
B 595-76	295	296	302	404	238	326	475
Russet Rural	-	-	200	-	-	-	-
Russet Burbank	236	-	-	-	-	-	-
Red Pontiac	-	-	-	-	-	-	589
Sebago	-	-	-	338	-	-	-
1377-78	167	-	-	-	-	-	-
2098-29	252	-	-	-	-	-	-
L.S.D. 5%	54	N.S.	61	87	41	61	72

Planted:	Apr. 21	May 24	May 22	May 31	June 7	June 11	May 21
Harvested:	Sept. 29	Sept. 20	Sept. 25	Nov. 1	Sept. 18	Sept. 29	Oct. 5
Soil:	Mineral	Mineral	Mineral	Mineral	Mineral	Muck	Muck
Fertilizer:	2000#	1600#	-	-	-	-	1600#
	7-7-7	10-10-10					10-10-10

N. Y. table 2.--New York State potato variety trials, 1956.

Variety	U. S. No. 1 grade over 2 inches in diameter and Counties where grown*						
	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
	1 7/8"		2"	2"	2"	2"	2"
<u>EARLY</u>	Pct.		Pct.	Pct.	Pct.	Pct.	Pct.
Irish Cobbler	95	-	91	85	72	90	97
Early Gem	67	-	95	93	81	79	98
Osseo	92	-	-	-	-	-	-
Keswick	98	-	-	-	-	-	-
Plymouth -	96	-	97	95	81	94	99
<u>MID-SEASON</u>							
Katahdin	97	-	94	90	85	93	99
Delus	93	-	97	96	92	97	100
B 2368-4 (Red)	93	-	93	96	-	85	99
Saco	72	-	95	98	88	95	99

continued

N. Y. table 2, continued.

U. S. No. 1 grade over 2 inches in diameter and Counties where grown*							
Variety	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
	1 7/8"		2"	2"	2"	2"	2"
LATE	Pct.		Pct.	Pct.	Pct.	Pct.	Pct.
Green Mountain	93	-	93	97	89	94	98
Merrimack	97	-	89	95	84	92	98
B 926-9	96	-	93	95	85	90	98
B 595-76	93	-	92	97	86	92	98
Russet Rural	-	-	87	-	-	-	-
Russet Burbank	100	-	-	-	-	-	-
Red Pontiac	-	-	-	-	-	-	99
Sebago	-	-	-	94	-	-	-
1377-78	95	-	-	-	-	-	-
2098-29	87	-	-	-	-	-	-
L.S.D. 5%	-	-	3.9	6.7	6.3	5.2	N.S.

* Not corrected for frost damage, late blight, mechanical injury or hollow heart.

N. Y. table 3.--New York State potato variety trials, 1956.

Specific gravity* and dry matter, and Counties where potatoes grown.							
Variety	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
<u>EARLY</u>							
Irish Cobbler	85	68	74	75	85	69	76
Early Gem	77	63	70	67	71	65	67
Osseo	67	-	-	-	-	-	-
Keswick	88	-	-	-	-	-	-
Plymouth	86	69	74	72	76	73	73
<u>MID-SEASON</u>							
Katahdin	82	67	76	70	80	71	73
Delus	94	75	79	81	84	84	81
B 2368-4 (Red)	82	71	71	69	-	72	73
Saco	85	72	74	81	85	76	77
<u>LATE</u>							
Green Mountain	103	78	77	80	85	81	80
Merrimack	95	75	78	81	84	87	80
B 926-9	74	63	70	68	78	75	67
B 595-76	94	76	79	80	82	81	80
Russet Rural	-	-	76	-	-	-	-
Russet Burbank	93	-	-	-	-	-	-
Red Pontiac	-	-	-	-	-	-	66
Sebago	-	-	-	72	-	-	-
1377-78	-	-	-	-	-	-	-
2098-29	94	-	-	-	-	-	-
L.S.D. 5%	4.0	5.1	2.7	2.9	3.8	3.2	4.2

* Coded 1.0

N. Y. table 4.--New York State potato variety trials, 1956.

Variety	Dry matter* and Counties where grown						
	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
<u>EARLY</u>							
Irish Cobbler	20.9	17.2	18.4	18.7	20.9	17.4	18.9
Early Gem	19.2	16.2	17.7	16.9	17.9	16.5	16.9
Osseo	16.9	-	-	-	-	-	-
Keswick	21.4	-	-	-	-	-	-
Plymouth	21.2	17.4	18.4	17.9	18.9	18.2	18.2
<u>MID-SEASON</u>							
Katahdin	20.2	16.9	18.9	17.7	19.7	17.9	18.2
Delus	22.7	18.7	19.7	19.9	20.7	20.7	19.9
B 2368-4 (Red)	20.2	17.9	17.9	17.4	-	17.9	18.2
Saco	20.9	17.9	18.4	19.9	20.9	18.9	19.2
<u>LATE</u>							
Green Mountain	24.9	19.4	19.2	19.7	20.9	19.9	19.7
Merrimack	22.10	18.7	19.4	19.9	20.7	21.2	19.7
B 926-9	18.4	16.2	17.7	17.2	19.4	18.7	16.9
B 595-76	22.7	18.9	19.7	19.7	20.2	19.9	19.7
Russet Rural	-	-	18.9	-	-	-	-
Russet Burbank	22.7	-	-	-	-	-	-
Red Pontiac	-	-	-	-	-	-	16.7
Sebago	-	-	-	17.9	-	-	-
1377-78	-	-	-	-	-	-	-
2098-29	22.7	-	-	-	-	-	-

* Specific gravities converted to dry matter from table supplied by U.S.D.A.

N. Y. table 5.--New York State potato variety trials, 1956.

Variety	Potato chip color* "Hunter Color Meter Readings" and Counties where grown						
	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
<u>EARLY</u>							
Irish Cobbler	-	16.2	10.6	14.9	17.4	17.7	17.0
Early Gem	-	14.1	7.2	15.4	25.6	14.2	21.4
Osseo	-	-	-	-	-	-	-
Keswick	-	-	-	-	-	-	-
Plymouth	-	14.2	7.2	10.2	24.3	14.3	20.3
<u>MID-SEASON</u>							
Katahdin	-	16.9	7.7	19.2	30.9	23.1	22.7
Delus	-	16.7	8.9	22.7	32.1	21.3	22.7
B 2368-4 (Red)	-	13.4	6.5	12.0	-	8.9	20.6
Saco	-	16.5	7.7	18.2	30.6	18.7	21.6

continued

N. Y. table 5, continued.

Potato chip color* "Hunter Color Readings" and Counties where grown							
Variety	Suffolk	Steuben	Wyoming	Cortland	Franklin	Orleans	Wayne
<u>LATE</u>							
Green Mountain	-	12.0	5.8	14.6	24.9	10.2	19.0
Merrimack	-	20.8	10.5	21.3	31.5	19.6	26.1
B 926-9	-	14.2	9.8	20.8	31.6	18.1	24.1
B 595-76	-	10.6	6.3	15.4	27.6	9.2	21.4
Russet Rural	-	-	9.7	-	-	-	-
Russet Burbank	-	-	-	-	-	-	-
Red Pontiac	-	-	-	-	-	9.7	-
Sebago	-	-	-	22.3	-	-	-
1377-78	-	-	-	-	-	-	-
2098-29	-	-	-	-	-	-	-
L.S.D. 5%	-	-	1.84	1.54	-	-	-
Date fried		9/27/56	12/5/56	11/9/56	10/21/56	11/8/56	10/2/56

* A color value greater than 16 is acceptable.

NEW YORK

L. C. Peterson and S. A. Alfieri

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The growing season of 1956 in south central New York was the best experienced in the past few years. Cool weather and abundant rain contributed toward the production of a large crop.

Breeding and selection are done in Ithaca, N. Y. All single-hill, 10-hill increase, 25-hill increase, and replicated yield plots are located on widely separated fields or areas of the same field on the University farm. With the exception of the blackspot and golden nematode problems, only advanced seedlings are tested in other areas of the State. In the case of the above-mentioned diseases, seedlings are tested either as single-hill or as 10-hill plots at 2 stations on Long Island. All plots are interplanted with the variety Katahdin which is used as a measure of yield. All, or a representative sample of tubers of the advanced seedlings, first, are indexed and later planted in units. Frequent roguing and spraying with insecticides are necessary in order to prevent virus spread. In spite of these precautions, virus spread has occurred. Observation seems to incriminate tractor and sprayer wheels as an important agent of virus dissemination. It is hoped that the importance of this factor can be greatly reduced by leaving alley ways for spraying throughout the plots.

In 1956, approximately 18,000 new seedlings, 600, 10-hill units and 200, 25-hill units were grown. Many of these seedlings combine resistance to more than one disease, such as blight, scab, blackspot, and the golden nematode.

Blight and Scab. Late blight has been absent from our plots in the past few years. This has limited our observations to greenhouse inoculation trials with known races of the pathogen. This year, however, late blight, while not abundant, was found in our plots. Cultures obtained from these infections have not been identified as to specific races.

The object of the program primarily has been concerned with an attempt to increase the gene concentration of some of the major genes. Within the limits of our inoculation trials, some of these seedlings appear resistant. Recently, an attempt has been made to incorporate some of the minor genes into this program.

Many of the seedlings treated under blight also possess some resistance to scab. This year seedlings produced from true seed were grown in the greenhouse in an infested vermiculite-soil mixture. The inoculation trials were very successful and at harvest time many individuals could be eliminated as susceptible before being subjected to field-exposure trials. Those which survive this treatment will be grown in scab-conditioned nurseries in Ithaca and on Long Island. Several hundred seedlings were grown on Long Island in 1956.

Leafroll. Varieties and seedlings possessing some resistance to the leafroll virus have been used as parental materials. For the first time this year several thousand seedlings, abundantly interspersed with infected *Datura* plants, were grown in a cloth house. Viruliferous aphids were introduced and the aphid population of the cloth house was maintained at a high level. The test appeared to be drastic, and many seedlings were eliminated the first year as susceptible.

In previous tests, seedlings were grown in rows alternating with plants infected with leafroll. The few seedlings which survived 2 years of exposure of this type were found to be susceptible when inoculations were made by means of caged viruliferous aphids.

Black-spot. Black-spot, a condition brought about by bruising, consists of a blackening of the tissue under the skin which is apparent when the tuber is peeled. Black-spot appears to be a physiological condition aggravated by some environmental condition. It does not seem to be caused by or to be associated with any currently known potato virus.

Seedlings are grown and stored on Long Island. Bruising and the rating of color intensity are done in mid-winter by the Department of Vegetable Crops. A large number of varieties and seedlings have been tested, and most of these were found to be susceptible. A few consistently have been free or nearly free of symptoms. Some of these have performed well under Long Island and Upstate conditions.

Golden Nematode. Three good sources of resistance to the golden nematode are available: Solanum sucrense, S. vernei and 4 collections of S. andigenum. For some obvious reasons most of the emphasis is placed on S. andigenum.

S. andigenum: Source material was originally obtained for our use by Dr. R. W. Hougas of the Plant Introduction Station. Material also was received from Dr. Toxopeus, Holland; Dr. Howard, England; and Dr. Black, Scotland. Resistant individuals were selected for breeding and crosses were made. It was found that about 50 percent of the individuals were resistant to the nematode which is in agreement with the results reported by various European workers. Some of the resistant individuals were back-crossed to susceptibles. In 1956, approximately 8,500 seedlings were grown in cloth houses at Hicksville, Long Island. Cyst material was added to infested potting soil to maintain a known high level of viable cysts. Of the seedlings tested, about 4,500 were classed as resistant.

To this group was added the seedlings provided by R. V. Akeley of the U. S. Department of Agriculture. Similar results were obtained.

S. sucrense: It previously has been shown that S. sucrense varied in its reaction to the nematode. Several lines were produced by inbreeding which have maintained their resistance to the nematode over a period of years. These have been used as parental materials. Solanum sucrense is more difficult to work with than is S. andigenum. It is wholly possible that the resistance found in S. sucrense is polygenic in nature.

S. vernei: This is a 24-chromosome species. Within the limits of our experience, it is not self-fertile. Seeds were obtained when crosses were made between different clonal types. Seeds thus obtained have been treated with colchicine and polyploids produced. Crosses have been made with this material. On a very limited basis about half of the seedlings tested were resistant.

NORTH CAROLINA
F. L. Haynes
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The 1956 yield trials and evaluations of new varieties and breeding lines were conducted at 7 locations in the State. At 3 of the 4 eastern locations early season weather conditions adversely affected stands so much that a large part of the data are of questionable value. From planting time during February until early April excessive rain and cold weather caused widespread seedpiece decay.

The objective of breeding for resistance to brown rot is being continued. To date, the only practical level of resistance is found in S. pinnatisectum. Having failed to obtain seed from crosses of this species with S. tuberosum, an attempt is now being made to transfer the resistance through an intermediate species.

One of the problems in making chips from the early crop from this State has been the rapid accumulation of reducing sugars in the tubers immediately following harvest. This is particularly serious in potatoes which are pre-cooled or held a few days at 60° F. or lower.

In a storage study conducted this year, one breeding line was found which accumulated reducing sugars at less than one-half the rate of 4 commercial varieties. In this study, tubers were stored at 60° F., and samples were analyzed for sugars at weekly intervals for 4 weeks. Samples were chipped at the same times. The breeding line 50B33-3 did not accumulate total sugars or reducing sugars sufficiently to impair its excellent chipping quality. This line was also among the highest in total solids. This study will be expanded in 1957.

In the past season, a few commercial growers experienced difficulty with the variety Boone because of severe damage from the root-knot nematodes. In 3 locations at lower elevations - below 2,000 feet - farmers suffered total losses of the Boone because of external tuber symptoms of nematode infestation. Other varieties growing in the vicinity had few or no external symptoms but were heavily infested with nematodes. The possibility of a hypersensitive reaction in the Boone variety is being investigated.

NORTH DAKOTA (Mandan)
W. P. Baird and W. A. Otto

Thirty-two varieties of potatoes were tested at the Northern Great Plains Field Station, Mandan, N. Dak., in 1956. Each variety was replicated 5 times in randomized blocks. Potatoes were spaced in rows $3\frac{1}{2}$ feet apart and 18 inches within the rows. Each row contained 25 hills. Potatoes were planted on May 25. Early varieties were harvested on September 21, and late varieties on October 8 after the vines had been killed by frost. Seed pieces were treated with Semesan Bel and 2 applications of 5% DDT dust satisfactorily controlled the Colorado potato beetle and potato leaf hoppers. No fertilizer was used. Rainfall was 13.30 inches from May 1 to September 30, or 2.31 inches above normal. Yields are somewhat below average. Scab was generally bad and hollow-heart was evident in most varieties. Total solids determinations were made from a composite sample containing 2 tubers from each replication.

The results of the test are shown in Mandan, N. Dak., table 1, in which the varieties are arranged in order from the highest to the lowest yielding.

Mandan table 1.--Potato variety trials at the Northern Great Plains Field Station, Mandan, N. Dak., 1956

Variety	Average Yield	U.S. No. 1	Total solids
	U. S. No. 1 per acre	compared w/ total	
	Bu.	Pct.	Pct.
Chippewa	206	89	23.6
Red Pontiac	194	95	18.7
Pontiac	186	93	18.7
Sequoia	182	93	18.4
Kennebec	182	94	19.3
White Rose	171	93	19.3
Rural New Yorker	167	95	17.1
Mohawk	162	91	21.0
Norkota✓	158	91	19.1
Russet Rural	158	94	19.3
Katahdin	154	90	18.7
Teton	153	90	22.3
Redkote	151	88	18.0
ND 457-1	143	87	20.0
Erie✓	132	89	22.4
Pawnee	125	82	18.7
Irish Cobbler	119	80	20.4
Houma	113	73	22.2
46952	110	91	18.7
Earlaine	102	76	21.4
Sebago	100	90	17.6
Earlaine #2	100	89	19.7
Warba	99	77	18.6

continued

Mandan table 1 continued.

Variety	Average Yield	U.S. No. 1	Total solids
	U. S. No. 1 per acre	compared w/ total	
	Bu.	Pct.	Pct.
Red Warba	95	76	19.5
Triumph	88	78	18.2
Osage	88	86	19.7
Mesaba	79	79	19.0
Early Gem	79	87	17.7
Cherokee	68	83	22.0
Waseca	66	83	18.8
Kasota	60	60	16.6
Progress	50	53	19.0
Mean	126		
LSD 1%	45		
LSD 5%	34		

NORTH DAKOTA
Wm. G. Hoyman

Seed Treatments for Blackleg

During the past 2 years cut Sebago seed was treated with various antibiotics and other materials to determine their value in reducing blackleg. The old acidulated mercuric chloride dip treatment reduced blackleg the most during the 2-year period, followed by dip treatments containing streptomycin. Dusts containing antibiotics have been disappointing.

Semesan Bel and mercuric chloride dip treatments were included in the 1956 experiment and gave results comparable to acidulated mercuric chloride.

Maintenance of Virus-Free Seed

Red Pontiac, Early Gem, Cherokee, and Kennebec are maintained free of viruses as a source of seed for certified growers. Any new varieties that North Dakota farmers grow and prove to be worthy of increase will be added to the list. No Red LaSoda tubers have been found that are free of virus X. The varieties will also be indexed for the presence of virus S.

Scab resistance

The Department of Horticulture furnished 119 selections for the scab trial at Northwood, N. Dak. The 1956 test was planted on the Aldrich Farm where russet scab is severe on the common varieties.

N. Dak. table 1.--Scab resistance data from the Northwood scab plot.

Scab readings^{1/}

1-2	2-2	3-2	4-2	5-2	3-3	1-4
Number of selections						
2	15	17	38	44	1	2

^{1/} First figure denotes the amount of infection and the second figure the type of scab.

Russet scab was denoted as type 2, and the data indicate all but 3 of the selections had some russet scab. ND3491-2 and ND3676-14 were the 2 having 1-2 readings. The 15 having 2-2 readings included ND457-1-35, ND2477-1, ND3022-8, ND3022-14-1, ND3224-1, ND3241-2R, ND3324-2, ND3356-14, ND3440-2, ND3569-1, ND3631-6R, ND3671-1, ND3676-20, ND3680-2 and ND3830-2R.

Virus Y Resistance

The 30 selections in N. Dak. table 2 were exposed to field infection during previous years. Of this group only ND3423-2 and B3637-1 showed symptoms at

emergence, while 5 selections had current-season symptoms.

N. Dak. table 2.--Virus-Y symptoms on selections exposed to field infection during previous years.

Selection	Number plants	At emergence No.	Current season No.	Selection	Number plants	At emergence No.	Current season No.
ND457-1-10	130	-	1	ND3545-10	3	-	-
" 457-1-16	193	-	-	" 3581-29	10	-	-
" 457-1-28	73	-	-	" 3596-8	8	-	-
" 457-1-33	48	-	-	" 3596-10	8	-	1
" 457-1-35	163	-	-	" 3596-13	22	-	-
" 457-1-36	189	-	-	" 3596-20	9	-	-
" 457-1-39	30	-	-	" 3596-27	10	-	4
" 3404-2	118	-	-	" 3557-2	6	-	-
" 3415-11	51	-	-	" 3620-5	12	-	-
" 3415-18	46	-	-	" 3636-13	3	-	-
" 3423-2	87	1	-	" 3636-20	11	-	-
" 3455-13	18	-	-	B3637-1	29	1	2
" 3455-19	14	-	-	B 3637-3	39	-	-
" 3455-32	8	-	-	B 3637-4	41	-	-
" 3557-16	15	-	-	ND3801-8	26	-	6
				Unknown	6	-	-

The progenies listed in N. Dak. table 3 had virus-Y resistance in 1 or both parents; they had never been exposed to field infection until 1956. A limited supply of seed was available, so it only was possible to plant approximately 4 hills of each selection. Eighteen of the 154 showed current-season symptoms.

N. Dak. table 3.--Current-season symptoms of virus Y on selections not exposed to field infection previous to 1956.

Selection	Virus-Y symptoms No.	Selection	Virus-Y symptoms No.	Selection	Virus-Y symptoms No.
ND457-1-10-13	-	ND3023-B-7R	1	ND3694-6	-
" " -14	-	" " -10R	-	" 3767-3	-
" " -15	-	" 3367-1R	1	" 3782-1	1
" " -16	-	" 3407-1R	-	" 3793-2R	-
" " -20	-	" 3545-2	-	" 3815-1R	-
" " -21	-	" 3557-1	-	" 3833-1-33	-
" 457-1-23-1	3	" " -8	1	" " -3	-
" 457-1-74	-	" 3596-1	-	" " -5	-
" " -76	-	" 3671-1	-	" 3858-1	-
" " -77	-	" 3676-11	1	" 3930-1R	-
" " -83	-	" " -14	-	" 3933-1	-
" " -84	-	" " -15	-	" " -2	-
" 2883-5	-	" " -17	-	" 3945-1	-
" 3022-8	-	" " -20 Rus	-	" " -2	-
" " -14-1	-	" " -25	-	" " -3	-
" " -29	-	" " -27	3	" 3948-3	-
" 3023-B-3R	-	" " -42	-	" " -5	-

continued

N. Dak. table 3, continued.

Selection	Virus-Y symptoms No.	Selection	Virus-Y symptoms No.	Selection	Virus-Y symptoms No.
ND3948-6	-	ND4077-4R	-	ND4105-15	-
" 3996-4	-	" " -7R	-	" " -20	-
" " -5	-	" " -8R	-	" 4106-3	-
" " -9	-	" 4099-3	-	" " -4	-
" 4001-2	-	" " -4	-	" 4121-4	-
" " -3	-	" " -5	-	" " -9	-
" 4015-1	-	" " -6	-	" " -15	-
" " -2	1	" " -11	-	" " -20	-
" " -3	-	" 4100-2	-	" " -25	-
" " -5	-	" 4101-6	-	" 4122-1R	1
" " -6	-	" " -7	-	" " -2	-
" " -7	-	" " -11	-	" " -4R	1
" " -8	-	" 4102-1R	-	" " -7R	-
" " -11	-	" " -2	5	" " -9R	2
" 4019-1	-	" 4103-1	-	" " -10	2
" " -3	-	" " -3	-	" " -11R	-
" " -4	-	" " -5	-	" " -12	-
" " -5	-	" " -7	2	" " -15R	-
" 4020-1	-	" " -11	-	" " -22R	-
" 4063-2	-	" " -12	-	" 4139-2	-
" " -6 Rus	-	" " -14	-	" " -4	-
" 4065-4R	-	" " -15	-	" " -5 Rus	-
" " -5	-	" " -21	-	" " -7 Rus	-
" " -6	-	" 4104-1R	-	" " -8	-
" " -8	-	" " -3	-	" 4140-5	1
" " -9	1	" " -11	-	" " -6	-
" " -11	-	" " -13	-	" " -7	-
" 4076-1R	-	" " -15	-	" " -8	-
" " -16R	-	" 4105-1	-	" " -12	-
" " -19R	1	" " -4	-	" " -13	-
" " -21	-	" " -5	-	" " -17	1
" " -24R	-	" " -8	-	" 4142-2	-
" 4077-1R	-	" " -9	-	" 4144-1	-
" " -2R	-	" " -10	-	M5429-1	-
				" -2	-

Late Blight Resistance

The extensive screening of seedlings and selections was continued in order to increase the stock having resistance to race 0. Seedlings from 60 crosses from the Department of Horticulture and 28 crosses from the Federal-State Program were inoculated while growing in flats. The detached-leaf method was used for testing 111 selections from the Department of Horticulture. Single-hill selections harvested in 1955 were tested by the same method, as well as unknown parental stock.

Virus X Immunity

Federal-State seedlings from 28 crosses were inoculated with a virulent strain of virus X after transplanting to 3 3/4-inch pots. Single-hill selections harvested in 1955 were also tested to be certain that none had escaped infection when inoculated the previous year.

Spraying virus X inoculum on seedlings growing in flats may be a rapid method of inoculation but rubbing each potted plant has proved to be a more certain method.

The Northwood Seedling Plot

The seedling plot contained approximately 4,000 seedlings from the Federal-State program and the Department of Horticulture. It was located on the Aldrich Farm where russet scab is severe on most all varieties. Only 49 single hills were saved for increase in 1957. Most of these were from crosses having resistance to scab and late blight and immunity to virus X.

Federal Stock from Chapman Farm

In order to obtain new stock, having multiple resistance for N. Dak. I selected the stock in tables 4 and 5 during the harvest at Chapman Farm, Presque Isle, Maine. The 31 selections in N. Dak. table 4 had been grown on Chapman Farm for 2 or more years while the stock in N. Dak. table 5 was selected from the single hills of 40 family lines. All of this stock will be planted at Northwood in 1957.

N. Dak. table 4.--Federal selections obtained from Chapman Farm in 1956.

Pedigree	Parentage	Resistance
B1435-14	B2068-23 selfed	A, Y
B1467-2	B2331-5 selfed	Y
" -8	" "	Sc
" -9	" "	Sc
B2894-24	Kennebec x Teton	Sc, Lb, A
B3114-52	B503-70 x B991-3	Sc, Lb
B3194-20	B595-76 x B936-12	Sc, Lb, X
B3391-19	B859-10 x B24-58	A, Lr
B3401-25	B922-3 x Menominee	Sc, Lb
B3452-10	B2162-36 x B2162-18	Sc
B3556-12	B595-76 x B24-58	Sc, Lb, X, Lr, Vw
B3599-8	B2935-7 x B3021-3	Sc, Lb, Y
" -11	" "	Sc, Lb, Rr
B3604-1	Saranac x B2395-14	Lb, X, Y, Rr
" -19	" "	Lb, X, Y, Rr
B 3626-13	B595-76 x B2067-52	Sc, Lb, A, X, Y, Vw
B3630-16	B2068-23 x "	Y
B3646-11	B595-76 x B2395-14	Sc, Lb, A, Y, Lr
B3696-13	B3097-16 x Ac.25959	Sc, Lb, A
B3710-1	Ac.25953 x 96-56	Lb, A, Y
B3719-1	" x B2331-5	Sc, Lb, A, Y
B3801-11	B606-37 x B24-58	Lb, X, Lr

N. Dak. table 4, continued.

Pedigree	Parentage	Resistance
B3807-12	B2944-65 x B2067-52	X
B3813-30	B24-58 x 3VW-9	Lb, Lr
B3814-23	" x B2067-52	Lr
B3829-16	Houma x Katahdin	Vw
B3833-24	B294-38 x B2209-25	Y
B3897-9	NDB3081-2R x B2997-9	Sc, X
B3903-1	LaSoda x B2368-4	Sc
B3925-7	B982-23 x B3209-35	X, Y
B3964-1	Ac.25966 x B929-32	Sc, Lb

N.Dak. table 5.--Federal selections from single-hill family lines obtained from Chapman Farm in 1956.

Pedigree	Parentage	Resistance
B4082	Cherokee x B81-40	Sc, Lb, A
B4083	Chippewa x Cherokee	Sc, Lb, A, Y, Net
B4084	" x B81-40	Sc, Lb, A, Y, Net
B4090	Kennebec x "	Sc, Lb, A, Net
B4093	Menominee x B881-12	Sc, Lb, Vw
B4094	Russet Rural x B3310-5	Sc, A
B4095	Rural New Yorker x B2834-3	Sc, Lr
B4097	Sacc x 47156	Lb, A, X, Net
B4098	B595-76 x B2834-3	Lb, A, X, Lr, Vw
B4099	" x 47156	Lb, A, X, Vw
B4100	79288 x B2359-84	A, X, Lr, Vw
B4101	" x B2962-9	A, X, Lr, Vw
B4102	792-94 x Katahdin	A, X, Vw, Net
B4105	" X B3139-24	Sc, Lb, A, X, Rr, Vw
B4106	B922-3 x B1172-16	Lb, Y, Vw
B4112	B1268-26 x Katahdin	A, Vw, Net
B4113	B1395-57 x B2834-3	Sc, Lb, A
B4114	B2331-5 x Dyk 2336	Sc
B4115	" x B2997-9	Sc
B4116	B2359-84 x B2834-3	Sc, Lr
B4119	B2368-4 x B3186-6	Sc, Y
B4128	B2962-6 x B2969-15	X, Lr
B4130	B3014-10 x B929-32	Sc, Lb
B4132	B3097-82 x Katahdin	Sc, Lb, A, Rr, Net
B4134	B3186-6 x B3139-24	Sc, Lb, Y, Rr
B4135	B3139-24 x Cherokee	Sc, Lb, A, Rr
B4136	" x B355-24	Sc, Lb, A, Rr
B4137	B3209-35 x B2962-6	A, X, Y, Lr
B4141	B3310-5 x B2834-3	Sc, A, Lr
B4144	47156 x "	Sc, Lr
B4145	Houma x B3195-3	Sc, Lr, Vw
B4154	B24-58 x "	Sc, A, Lr, Vw
B4155	B24-78 x "	Sc, Lr, Vw

continued

N. Dak. table 5, continued.

Pedigree	Parentage	Resistance
B4160	B595-76 x B3508-8	Sc, Lb, A, X, Vw
B4167	B2837-12 x B355-24	Lb, Rr
B4170	B3139-24 x B3201-32	Sc, Lb, Rr, Vw
B4171	B3195-3 x B355-24	Sc, Lb, Rr, Vw
B4176	B3508-8 x Menominee	Sc, Lb, Vw
B4191	B3195-3 x Ac.25976	Sc, Lb, Vw
B4212	B3516-11 x Dyk 5230	Sc, Lb, Vw

Advanced Selections

Fifty advanced selections from 5 different sources were grown at Northwood where russet scab is severe. B3627, a selection with white skin having resistance to scab and late blight and immunity to virus X, was the only one of this group that looked sufficiently promising to increase further. The parents of this selection are B606-37 x B2067-52. Because the female parent has resistance to virus A and the male parent to virus Y, this selection will be tested for resistance to these viruses.

Seventeen other selections were saved for parental stock. Included in this group are 4 russets and 3 red, each having resistance to scab and late blight, and immunity to virus X.

Seed Increased for the Texas Trial

Advanced selections and varieties were supplied by several cooperators and grown at Northwood as a common source of seed for the trial in the Rio Grande Valley, Weslaco, Texas. Twenty-three (N. Dak. table 6) of the 45 were selected for the Texas experiment.

N. Dak. table 6.--Selections and varieties selected for trial in the Rio Grande Valley.

Variety	Source of seed	Color	Maturity
C12240	Edmundson, Colo.	R	M
A218-2	McLean, Idaho	R	LL
I801-10	Kehr, Iowa	W	LL
I912-6	" "	W	L
La 91-10	Miller, La.	W	M
La 91-143	" "	W	M
Minn. 11	Krantz, Minn.	W	M
Chisago	" "	W	M
Waseca	" "	Brown	EE
Nebr.82.49-1X	Werner, Nebr.	Pink	M
Nebr.131.50-2	" "	R	E
Nebr.215.50-2	" "	R	M
ND457-1-16	Johansen, N. Dak.	W	E

continued

N. Dak. table 6, continued.

Variety	Source of seed	Color	Maturity
ND2774-3R	Johansen, N. Dak.	R	E
ND2906-1R	" "	R	E
Kennebec	Hoyman, N. Dak.	W	ML
Cherokee	" "	W	M
Red Pontiac	" "	R	M
Redkote	" "	R	M
Red LaSoda	" "	R	L
Wisc.49.54	Rieman, Wis.	R	M
Wisc.125.52	" "	W	M
Wisc.141.52	" "	W	M

NORTH DAKOTA
Robert Johansen, Nick Sandar, and E. P. Lana

The problem, objectives, and plan of work in potato breeding for North Dakota remain essentially the same as reported in the 1951 report.

Potato Crossing Program

During 1956, 147 controlled crosses and 13 self-pollinations were made in the greenhouse. Selections and varieties used as parents in the crossing program were planted in 8-inch pots on January 4, 1956. The crossing program started on February 16 and was completed on April 26, 1956, and the seed was extracted from the seed balls the first 2 weeks in June. Selections and varieties used as parents had a high degree of resistance to scab, late blight, and viruses X and Y. Parental lines used extensively in the crossing program were ND 457-1, ND 457-1-10, ND 457-1-16, ND 2853-3R, ND 2910-1R and ND 2906-1R.

Greenhouse and Field Seedlings

Seedlings numbering 25,530 from 184 controlled crosses were transplanted in the greenhouse benches during August and September. Of these seedlings 4,848 were grown in 3-inch pots and the remainder in the open greenhouse benches. These seedlings were harvested in November and December and stored in the potato cellar until ready for field planting next spring.

Late blight and virus X inoculation of seedling families bred for resistance were again made in cooperation with Dr. W. G. Hoyman, Department of Plant Pathology. Families as follows were screened by these inoculations: 20 for virus X immunity, 29 for late blight resistance, and 36 for both virus X immunity and late blight resistance. Many of the susceptible seedlings were eliminated at transplanting time as a result of seedling inoculation with these diseases.

First-year seedlings numbering 17,902 were grown in the field at the Langdon Experiment Station. From these approximately 1,000 individual hills were saved at harvesttime for further testing and evaluation. An additional 2,720 hills having ND 457-1 as a parent were saved for a virus Y study. Many of the clones selected possessed a high degree of resistance to scab, late blight, and viruses X and Y, in combination with red and white skin color, russet skin, and good tuber type.

Advanced Selections

Advanced selections were grown under isolation from virus diseases at the Langdon Experiment Station with variable field exposure to various diseases at Grand Forks.

A summary of seedlings and selections grown and those saved for further testing follows:

Age of clones	Number grown	Approximate Number selected
1st year seedlings	17,902	1,000
2nd year seedlings	482	102
3rd year seedlings	75	42
4th year seedlings	68	46

Advanced selections, ND 2774-3R, ND 2906-1R, ND 2555-12R and ND 457-1-16 were again distributed to foundation seed growers. In 1956 foundation seed growers grew approximately 3 acres of the red selection ND 2906-1R. This selection is outstanding in that it has moderate scab resistance, early maturity, good tuber type, high yield, and good chipping and table qualities. If other tests are favorable this selection will be ready for introduction in 1957. Foundation seed growers also grew approximately 10 acres of ND 457-1-10, 5 acres of ND 457-1-16, and 2 acres of ND 2774-3R. In adaptability to North Dakota conditions, ND 457-1-16 appears to be superior to its sister selection ND 457-1-10. Selections ND 457-1-10 and 457-1-16 are both early and possess some field resistance to virus Y. However, they are found to be quite susceptible to pitted scab. In the northern area of the Red River Valley, ND 2774-3R seems to be quite well adapted in that it produces tubers of good type, deep red skin color, and good yield. This selection also has excellent chipping quality. As it was found to be a symptomless carrier of virus Y, ND 2910-1R was discarded by foundation seed growers. In trials conducted throughout the State the more recent advanced selections ND 3631-6R, ND 3324-2 and ND 3707-1R were found to be the most outstanding.

Testing for Disease Resistance

(a) Late Blight and Virus X During February and March of 1956, 138 advanced selections were tested for resistance to virus X and late blight. Of these, 42 were found to be resistant to both virus X and late blight, 41 resistant to late blight, and 22 resistant to virus X. All of these selections were screened in the seedling stage by a similar inoculation.

(b) Virus Y A study was made to determine the degree of field resistance to virus Y possessed by the potato selection ND 457-1, and to determine the incidence of virus Y in tubers harvested from infected plants.

The test was made by growing two replicated plots of ND 457-1 and the susceptible variety Red Pontiac. As a source of field inoculum for transmission of virus Y by aphids, the virus Y carrier ND 530 was planted within each plot.

Results from this test revealed that in comparison to Red Pontiac, ND 457-1 possessed a high degree of field resistance to virus Y. This test also revealed that ND 457-1 possessed a factor that delayed the movement of virus Y within the plant.

(c) Scab During 1956, 202 and 121 advanced selections were grown in scab trials at Fargo and Northwood, respectively. Favorable scab tests were obtained in both these trials. The scab found at Northwood generally consisted of the russet type with the russet and pitted type prevailing at Fargo. In comparison with the susceptible check variety Triumph, many new selections possessed a high degree of resistance to scab.

Variety Trials

Variety trials in 1956 were similar to those conducted in 1955. They are referred to as the Early Harvest Variety Trial, Red Variety Trial, State-Wide Variety Trial and North Central Regional Variety Trial. All variety trials were grown as randomized replicated blocks with 25 trial plants and 2 buffer plants per variety or selection. Appropriate fertilizer applications were made at planting time.

I. Early Harvest Potato Variety Trial

The Early Harvest Potato Variety Trials organized in 1955 were again planted at Park River and Grand Forks. The 1956 trial consisted of 12 varieties and selections grown in a randomized block, with 3 dates of harvest August 1, 15, and 29. The objective of this trial was to evaluate promising new selections as to early marketable yield, specific gravity, chipping quality, tuber type, and resistance to scab, silver scurf, skinning and bruising. Each selection was compared with such standard varieties as Red Warba, Triumph, Red Pontiac, Early Gem and Cobbler.

(a) Yield and Specific Gravity At both locations the early-maturing selections ND 457-1-16 and ND 2906-1R produced high marketable yields on August 1 and 15. Yields obtained from these 2 selections indicated that the grower may harvest these varieties profitably during August. The late-maturing check variety Red Pontiac increased in yield on August 15 and 29 harvest dates.

Early-maturing varieties and selections had a higher specific gravity than late-maturing varieties on the August 1 harvest date. However, the late-maturing ones produced increasingly higher specific gravity as the season advanced. At all harvest dates high specific gravity generally occurred in Cobbler and the selection ND 2774-3R, ND 457-1-10 and ND 457-1-16.

Marketable yield and specific gravity of 12 varieties and selections grown at Park River and Grand Forks are found in Johansen tables 1 and 2, respectively.

(b) Size A Kerian potato sizer was used to determine the size of all potatoes grown in the early harvest potato variety trial. Tubers of the selection ND 2906-1R were very uniform in size and shape, with the majority of the tubers between 1 7/8 and 3 inches in diameter. On the August 1 harvest date Cobbler, ND 457-1-10 and ND 457-1-16 produced many tubers over 3 inches in diameter indicating the ability of these varieties to produce size early in the season. The late-maturing variety Red Pontiac did not produce many tubers that were over 3 inches in diameter until the August 29 harvest date.

(c) Chipping Tests In cooperation with the USDA, Potato Research Center, East Grand Forks, Minn., chipping tests were conducted on 8 varieties and selections. Twenty tuber samples were chipped from the August 15 and August 29 harvest dates. Results from this test indicated that the early red selection ND 2774-3R was excellent in chipping quality. This selection was followed in chipping performance by ND 2906-1R and ND 2555-12R. These 3 red-skinned selections appeared to be superior to the standard chipping variety Cobbler when chipped early and directly after harvest. Under similar conditions the early white selections ND 457-1-10 and ND 457-1-16 were found to be unsuitable for potato chips. Chipping quality of 8 varieties and selections grown at Park River and Grand Forks, N.Dak., are reported in Johansen table 3.

Johansen table 1.--Early harvest potato trial, Park River, 1956. Marketable yield and specific gravity of 12 varieties planted, May 10*

Variety	Yield per acre and specific gravity for 3 harvest dates					
	August 1		August 15		August 29	
	Marketable yield	Specific gravity	Marketable yield	Specific gravity	Marketable yield	Average specific gravity
ND 2906-1R	Bu. 264	1.069	Bu. 335	1.080	Bu. 370	Bu. 323
ND 2774-3R	142	1.075	211	1.089	245	200
ND 2555-12R	183	1.070	256	1.080	281	240
ND 457-1-16	261	1.068	318	1.087	436	338
ND 457-1-10	210	1.071	292	1.083	371	291
Cobbler	235	1.071	331	1.091	399	322
Early Gem	109	1.060	185	1.073	261	185
Manota	250	1.071	361	1.090	390	334
Red Pontiac	190	1.061	266	1.075	412	289
Red Warba	260	1.068	314	1.090	352	309
Triumph	260	1.064	322	1.083	433	338
Waseca	179	1.069	251	1.084	309	246
L.S.D. 1%	85.7	.0055	85.7	.0055	85.7	49.5
5%	64.4	.0041	64.4	.0041	64.4	37.2

* Marketable yield in bushels per acre.

Johansen table 2.--Early harvest potato trial, Grand Forks, 1956. Marketable yield and specific gravity of 12 varieties planted May 22*

Variety	Yield per acre, and specific gravity for 3 harvest dates					
	August 1		August 15		August 29	
	Marketable yield	Specific gravity	Marketable yield	Specific gravity	Marketable yield	Average specific gravity
ND 2906-1R	Bu. 159	1.070	Bu. 240	1.086	Bu. 269	Bu. 223
ND 2774-3R	77	1.077	152	1.096	184	138
ND 2555-12R	85	1.076	195	1.092	225	168
ND 457-1-16	188	1.070	257	1.091	304	250
ND 457-1-10	150	1.074	241	1.091	250	214
Cobbler		1.074	212	1.095	263	216
Early Gem		1.061	121	1.080	189	122
Manota	148	1.071	213	1.092	271	211
Red Pontiac	151	1.068	254	1.082	360	255
Red Warba	164	1.070	185	1.088	257	202
Triumph	158	1.067	237	1.085	281	225

continued

Johansen table 3.--Early harvest potato variety trials, 1956. Chipping quality of 8 varieties^{1/}

Variety	Color score and percentage yield for 2 harvest dates					
	August 15		August 29		Average	
	Color score ^{2/}	Yield Pct. ^{3/}	Color score	Yield Pct.	Color score	Yield Pct.
ND 2774-3R	89.0	35.2	84.3	33.6	86.5	34.4
ND 2906-1R	78.3	31.1	79.7	30.8	79.0	31.0
ND 2555-12R	76.7	32.8	70.0	31.3	73.4	32.1
ND 457-1-10	63.7	33.6	75.0	33.0	69.3	33.3
ND 457-1-16	66.7	33.6	75.7	33.6	71.2	33.6
Cobbler	73.0	34.7	77.7	32.7	75.4	33.7
Early Gem	76.7	31.6	75.3	30.5	76.0	31.1
Manota	76.7	33.9	75.0	34.6	75.9	34.3

Grand Forks						
ND 2774-3R	90.0	35.1	85.7	34.6	87.9	34.9
ND 2906-1R	75.7	33.6	84.7	32.9	80.2	33.3
ND 2555-12R	81.7	33.5	82.3	34.2	82.0	33.9
ND 457-1-10	66.7	34.1	67.0	33.5	66.9	33.8
ND 457-1-16	67.3	32.8	67.7	33.5	67.5	33.2
Cobbler	70.7	34.8	74.7	36.5	72.7	35.7
Early Gem	80.0	31.8	80.0	31.7	80.0	31.8
Manota	73.0	34.2	75.0	34.2	74.0	34.2

^{1/} Tests conducted by Dr. H. Findlen and John Hansen, Red River Valley Potato Research Center, East Grand Forks, Minn.

^{2/} Color score below 70 generally not acceptable.

^{3/} Percent based on 100 pounds of potatoes.

II. Red-Skinned Potato Variety Trial

The red-skinned potato variety trial consisted of 5 named varieties and 14 advanced selections and was grown on the Red River Valley Potato Growers Research Farm, Grand Forks, N. Dak. This included 9 North Dakota selections and 5 selections developed by Ben Picha, Grand Forks, N. Dak. Total yield, percent U. S. No. 1, and specific gravity data from this trial are reported in Johansen table 4.

Johansen table 4.--Red-skinned potato variety trial. Total yield in bushels per acre, percent U. S. No. 1, and specific gravity of varieties and selections grown at Grand Forks, N. Dak.

Variety	Total	U.S.No.1	Specific gravity
	Bu.	Pct.	
Triumph	457	92	1.083
Red Pontiac	436	98	1.080
ND 2906-1R	372	95	1.079
ND 3023-B-10R	363	96	1.083
ND 3367-1R	356	95	1.082
Picha 50.4-53-40	349	94	1.083
ND 2910-1R	347	97	1.084
ND 3057-2R	333	95	1.083
Redkote	329	93	1.082
Red Warba	328	88	1.084
Red LaSoda	326	91	1.081
ND 2555-12R	315	95	1.082
ND 2929-8R	312	87	1.085
Picha 51.1-53-15	300	92	1.080
Picha 51.1-53-13	284	90	1.082
Picha 51.1-53-17	284	91	1.083
ND 2774-3R	278	91	1.083
ND 3023-B-3R	250	81	1.084
Picha 51.1-53-20	219	93	1.082
Average	328	93	1.082
L.S.D. 5%	57		.0039
L.S.D. 1%	76		.0053

1/ Specific gravity was determined by the use of the potato hydrometer, using an 8-pound sample from 3 replicates.

Triumph and Red Pontiac yielded an average of 457 bushels per acre, respectively which were the highest yields. Advanced selections possessing good yield and tuber type were ND 2906-1R, ND 3023-B-10R, ND 3367-1R, 50.4-53-40 and 2910-1R.

In this trial little differences were found in specific gravity readings. Selections found to be quite high in specific gravity were ND 2929-8R, 3023-B-3R, ND 2910-1R, and Red Warba.

Scab and silver scurf were prevalent on all varieties and selections, However, ND 2906-1R and Redkote Expressed the most resistance.

III. State-Wide Potato Variety Trial

The State-wide potato variety trials were grown at 6 locations in 1956. The average total yields for the trials were highest at Williston under irrigation with 543 bushels per acre. At Williston, the irrigated trial outyielded the dryland trial by an average of 287 bushels per acre. Lowest yields were found at Minot with an average total yield of 187 bushels per acre.

Red Pontiac averaged a total yield of 512 bushels per acre, and was the highest yielding variety at all locations. This variety was followed in yielding performance by Triumph and ND 2906-1R. At all locations, except Fargo, ND 2774-3R was found to be the lowest yielding variety, which indicated that this selection is better adapted to soils of finer texture. At most locations, little or no difference in yield was found between the 3 white-skinned selections ND 457-1-10, ND 457-1-16 and ND 457-1-35. However, data from these trials indicated that ND 457-1-16 was superior to ND 457-1-10 in scab resistance and type and superior to ND 457-1-35 in table quality and flesh color. In the 3 trials in eastern North Dakota, ND 3057-1R and ND 3324-2 produced high yields. Of these 2 selections ND 3324-2 appears to be the most promising. Total yield and percent U. S. No. 1 are reported in Johansen table 5.

Johansen table 5.--Total yield in bushels per acre and percent U. S. No. 1 of potato varieties and selections grown in State-wide potato variety trials in 1956.

Variety	Location and total yield per acre						Average yield per acre	
	Fargo	Grand	Park	Minot	Williston		U.S.	No.1
		Forks	River		Dryland	Irrigation		
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Pct.
Red Pontiac	679	483	568	271	344	727	512	92
Triumph	559	423	445	203	272	538	407	88
ND 2906-1R	520	419	454	183	278	574	405	93
ND 2555-12R	464	413	360	207	243	562	375	91
ND 457-1-16	411	427	430	176	246	501	362	92
ND 457-1-10	399	393	389	166	265	518	355	91
Early Gem	445	371	367	162	177	532	342	83
ND 457-1-35	444	326	375	163	258	480	341	93
ND 2774-3R	490	289	301	150	223	452	318 ^{1/}	90 ^{1/}
ND 3057-1R	609	431	493				511 ^{1/}	89 ^{1/}
ND 3324-2	511	430	482				474 ^{1/}	95 ^{1/}
ND 3501-3 Russ	422	367	317				369 ^{1/}	60 ^{1/}
Antigo	439	315	329				361 ^{1/}	92 ^{1/}
Average	492	391	408	187	256	543	380 ^{2/}	90 ^{2/}
LSD 5%	99	45	61	30	35	75		
LSD 1%	133	92	91	40	47	102		

^{1/} Average, 3 locations.

^{2/} Average, 6 locations.

Based on trials, ND 2774-3R, ND 457-1-10 and ND 457-1-16 were highest in specific gravity; Early Gem and Red Pontiac were the lowest. In the 3 eastern trials ND 3324-2 was the highest in specific gravity. Data on specific gravity is presented in Johansen table 6.

Except for Early Gem and ND 3501-3 little or no difference was found in percent U. S. No. 1. Growth cracks and second growth constituted the greatest defects in these two russet varieties.

Johansen table 6.--Specific gravity of potatoes grown in State-wide potato variety trials in 1956.^{1/}

Variety	Fargo	Grand Forks	Park River	Minot	Williston		Average
					Dryland	Irrigation	
ND 2774-3R	1.084	1.085	1.087	1.086	1.089	1.087	1.086
ND 457-1-10	1.081	1.083	1.088	1.090	1.089	1.083	1.086
ND 457-1-16	1.083	1.084	1.090	1.088	1.085	1.084	1.086
ND 457-1-35	1.086	1.078	1.086	1.083	1.084	1.082	1.083
ND 2555-12R	1.076	1.084	1.085	1.083	1.087	1.075	1.082
ND 2906-1R	1.074	1.080	1.078	1.081	1.083	1.077	1.079
Triumph	1.078	1.079	1.077	1.082	1.084	1.076	1.079
Red Pontiac	1.071	1.081	1.076	1.076	1.086	1.075	1.078
Early Gem	1.074	1.075	1.076	1.076	1.079	1.079	1.076
ND 3324-2	1.084	1.088	1.094				1.089 ^{2/}
Antigo	1.082	1.081	1.082				1.082 ^{2/}
ND 3057-1R	1.074	1.080	1.080				1.078 ^{2/}
ND 3501-3 Russ	1.074	1.072	1.076				1.074 ^{2/}
Average	1.079	1.081	1.083	1.083	1.085	1.080	1.082 ^{3/}
LSD 5%	.0046	.0031	.0046	.0041	NS	.0046	
LSD 1%	.0061	.0041	.0062	.0056	NS	.0063	

^{1/} Specific gravity was determined by the use of the potato hydrometer, using an 8-pound sample from all replicates.

^{2/} Average, 3 locations.

^{3/} Average, 6 locations.

Varieties and selections found to have good to moderate scab resistance were Early Gem, Antigo, ND 2906-1R, ND 457-1-35 and ND 3324-2. Triumph, ND 3057-1R and ND 2906-1R showed the least amount of silver scurf, while ND 2774-3R, ND 2555-12R, and Red Pontiac expressed the most.

IV. North Central Regional Potato Variety Trial

The north central regional potato variety trial grown at Grand Forks included 10 advanced selections, 1 named and 3 check varieties. The results from this trial are being reported cooperatively by the North Central States.

The Nature of Virus Y Resistance in the Potato Selection ND 457-1 and Some of Its Progenies (Contributing Project to North Central Regional Project on Potato Breeding) (NC-35).

Objectives: (1), To determine the characteristics that are responsible for virus Y resistance; (2), To study the breeding behavior of desirable lines; (3), To develop virus Y resistance and/or immunity in parental lines and new varieties.

Present status of project: Funds for work on this project became available on July 1, 1956. Virus Y is one of the many diseases that affect the potato crop in North Dakota and has caused considerable loss to the potato grower. Research at the North Dakota Agricultural Experiment Station has indicated that it is possible to obtain resistance to this virus. The breeding program would be facilitated if the characteristics responsible for resistance were known.

North Dakota line ND 457-1 has been found relatively free from virus Y in seasons when virus Y is abundant in other selections and varieties. Greenhouse studies have shown that virus Y can be transferred mechanically to ND 457-1. Greenhouse and field experiments have shown that ND 457-1 is highly resistant when the green peach aphid (Myzus persicae) is the vector. Further studies have indicated that some inbreds and other progenies of ND 457-1 are also highly resistant in the greenhouse and field when M. persicae is used as a vector.

Procedure: Crosses containing ND 457-1 or inbreds of ND 457-1 were harvested this fall. This material included 24 seedling families, involving 2,720 single hills. These seedling families will be ideal for population genetic studies since most crosses contain sizable populations. Two hundred fifty-four second-year selections, 27 third-year selections, and 9 fourth-year and older selections were also harvested that contained ND 457-1 or its inbreds as one of the parents. The material lends itself to progeny testing very well since in the major number of crosses the same parent was used with ND 457-1 and the better types of ND 457-1 inbreds.

The seedling populations will be grown in the greenhouse this winter. Viruliferous aphids will be allowed to feed on the plants to determine the susceptible individuals. The survivors of this test will be placed in the field to determine their reaction under natural conditions. Selections that have survived in the field will be grafted to ND 530, a virus Y carrier, to determine if immunity was present.

OHIO (Wooster)
John Bushnell

Potato Variety Trials, 1956

Seven new varieties and seedlings were tested for the first time this year, together with 12 other recent introductions and several old standards. The trials at Wooster were planted at 2 dates on Wooster silt loam. Each plot was a single row of 40 seedpieces, in a space of 36 feet, and if ample seed was on hand, each variety was grown in 4 replicates, in both plantings.

May was wet. The first planting, made as soon as the soil was judged suitable to plow, was May 18. The second was June 11.

The soil continued wet throughout most of the season. Instead of driving through the plots with a sprayer, sprays were applied with an orchard sprayer driven around the plots. Similarly, the plots were not cultivated until late August. Earlier, when weeds became as tall as the potato vines, the bigger weeds were pulled by hand. With an abundance, or excess of moisture, the presence of the weeds appeared to be beneficial rather than detrimental. In spite of heavy rains the soil remained mellow, and the yields in the first planting were as large as obtained in any previous year. The June planting, however, was damaged by early frost, September 21, only 101 days after planting.

Following the present practice of the Crop Reports, the yields are here given in hundred-weight per acre. To convert to equivalent bushels, multiply by 1.67 (or divide by 0.6). For example, 240 cwt. equals 400 bushels.

SOURCE OF SAMPLES

Most of the varieties included were contributed by interested growers or dealers in certified seed potatoes. More than half of the samples were donated through the Ohio Farm Bureau, Columbus, Ohio. Other contributors were: New York Potato Growers Cooperative, Bouckville, N. Y.; Dr. Cecil W. Frutchey, Potato Certification Service, Fort Collins, Colo.; Ben Picha, Box 816, Grand Forks, N. Dak.; Geo. Mahlenbacher and Sons, Wayland, N. Y.; Starks Farms, Starks, Wis.; and W. L. Wykoff, Alba, Mich.

COMMENTS ON SOME OF THE INDIVIDUAL VARIETIES (See Ohio tables 1 and 2)

Starks 1429 from Starks Farms (Wis.) was about 2 days earlier than Cobbler, with smoother tubers, and free from hollow heart. Although this is the first season tested in Ohio, its freedom from tuber defects makes it a most promising early white potato.

Waseca, tested for several years, is an extra early red potato with somewhat rough surface, not equaling Cobbler in cooking quality.

Chippewa stood out as a high-yielding, smooth, white potato, but in this wet season was almost as late as Katahdin. It had less hollowheart than either Cobbler or Katahdin. Chippewa has been known in Ohio for over 20 years, and

its shortcoming is that wounds are slow to heal, so that damaged tubers often rot. Only where the crop can be carefully sorted is Chippewa a good risk. Its good yields, however, since modern insecticides have been used, would seem to justify the care required to handle it.

Cherokee is reputed to have scab resistance but has given low yields of rather rough potatoes in these Ohio trials.

Pungo has considerable resistance to late blight but judging from 5 years of testing seems to have no place in Ohio. Note its high proportion of hollowheart in Ohio table 2.

Desota, Red Pontiac and Red LaSoda are popular high-yielding varieties west of Lake Michigan, but all develop too many ill shapes in Ohio. They looked better in 1956 than previously. If one is seeking merely big yield, note that Red Pontiac planted May 18 produced at the rate of 370 bags per acre; 617 bushels of Size A.

Redkote, (Ben Picha, N. Dak.) because the sample arrived late, it was included only in the June planting. As in previous seasons, it was by far the most attractive red potato in the trials. On the other hand, it showed as much hollow heart as either Russet Rural or Cobbler.

Plymouth, from North Carolina, Merrimack from New Hampshire, and Delus from Delaware, were rather distinctive and attractive in appearance, but did not yield well enough in these trials to be suggested for Ohio growers.

Canso and Keswick are Canadian varieties that seem of no special value in Ohio.

If a premium can be obtained for an Ohio-grown baking potato, Saco appears more promising than Russet Burbank (the Idaho baker). Saco, recently named by Maine and U. S. Department of Agriculture, is a large round irregular-shaped potato with high starch content. It outyielded Russet Burbank by more than 130 bags per acre in both plantings this year. With either variety, almost half the crop was out of grade because of ill shapes. Consequently, neither variety seems likely to be grown in Ohio for regular trade channels; but for local sale, Saco offers a combination of enormous yield with superior baking quality, a combination which may move irregular shapes.

Canoga (Mehlenbacher, N. Y.), because of its very long growing season, needs to be planted early. In early planted trials it has been similar to Katahdin in both yield and quality. This year it rated above Katahdin in specific gravity.

Ohio table 1.--Variety trial at Wooster, planted May 18, 1956

Variety	Maturity	U. S. No. 1	Rough	Green	Total size A	Size B	Total solids	Hollowness in 20 lar- gest tubers
	No.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Pct.	No.
Starks 961	110	178	8	6	192	17	16.9	0
Starks 11429	112	197	21	1	219	24	17.7	0
Irish Cobbler	114	211	47	7	265	30	18.0	7
White Cloud	115	197	21	3	221	19	18.4	3
Cherokee	122	163	44	5	212	21	18.6	0
DeSota (red)	122	238	50	3	291	42	17.2	11
Keswick	122	249	74	9	332	11	18.4	0
Red Pontiac	124	322	46	2	370	20	16.9	1
Russet Burbank	124	134	109	1	244	38	18.9	0
Chippewa	126	292	26	5	323	27	16.9	1
Pungo	126	252	24	8	284	24	18.0	3
Canso	126	218	6	8	232	22	19.1	0
Delus	126	185	65	4	254	20	18.4	0
Katahdin	128	290	15	12	317	16	17.4	5
Plymouth	128	221	59	10	290	12	18.0	2
Kennebec	130	242	33	22	297	25	17.2	4
Saco	130	200	188	50	438	18	18.2	0
Red LaSoda	130	256	93	12	361	15	16.3	0
Russet Rural	132	283	34	2	319	14	19.4	7
Sebago	136	254	26	9	289	23	16.9	0
Merrimack	144	181	18	5	204	11	19.7	2
Canoga-	150	294	44	24	362	14	19.1	3

L.S.D. at .05 = 58

Ohio table 2.--Variety trial at Wooster, planted June 11, 1956.

Variety	Vines dead Sept. 20*	U. S. No. 1	Rough	Green	Total size A	Size B	Total solids	Hollowness in 20 lar- gest tubers
	Pct.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Pct.	No.
White Cloud	100	169	11	9	189	32	18.6	0
Waseca (red)	100	180	32	5	217	30	16.3	0
Starks 11429	100	164	12	1	177	40	17.5	0
Irish Cobbler	95	158	44	12	214	48	18.2	9
Early Gem	95	175	32	5	217	30	16.7	3
Starks 961	90	160	19	11	190	24	17.2	0
Chippewa	80	217	27	9	253	41	16.9	3
DeSota (red)	70	182	47	7	236	30	16.7	15
Canso	70	154	13	13	180	35	18.6	5
Pungo	60	227	33	10	270	27	18.9	16
Redkote	60	231	13	6	250	33	16.3	10
Keswick	50	174	31	11	216	28	18.2	0
Cherokee	40	131	58	5	194	48	18.0	0
Red Pontiac	40	265	36	4	305	23	16.0	10
Red LaSoda	40	272	51	4	327	17	16.9	1

continued

Ohio table 2, continued.

Variety	Vines dead	U. S.	Rough	Green	Total size	Size	Total	Hollowness
	Sept. 20*	No. 1			A	B	solids	in 20 largest tubers
	Pct.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Pct.	No.
Plymouth	30	172	50	21	243	23	19.1	2
Katahdin	30	240	19	11	270	25	18.0	7
Russet Burbank	20	114	84	2	200	85	20.4	0
White Rose	20	124	123	41	188	44	16.3	0
Kennebec	20	231	36	30	297	32	17.7	3
Red McClure	10	124	27	3	154	34	18.4	2
Russet Rural	10	225	17	2	244	30	19.7	10
Sebago	10	190	26	21	237	25	18.4	8
Delus	10	105	17	5	127	40	20.6	5
Merrimack	10	213	16	3	232	18	20.6	3
Saco	10	176	124	35	335	29	19.2	4
Canoga	0	217	29	33	279	23	19.9	3

L.S.D. at 5 % = 74

* Most of the green foliage was killed by frost September 21.

OHIO
J. P. Slesman

The object of the program in Ohio is to combine in one horticulturally acceptable variety resistance to the potato leafhopper, flea beetle, and aphids. Emphasis has been placed on the development of a leafhopper-resistant variety, since in Ohio this insect reduces the yield of potatoes more than any other pest attacking the foliage.

Growing conditions in Ohio were both favorable and unfavorable in 1956. Temperatures were below normal and rainfall was above average for all of the months of the growing season. Total rainfall of 7.22 inches in May kept the ground saturated resulting in the decay of many seedpieces. In general, weather conditions were highly favorable for the development of late blight which caused serious losses in various parts of the State.

Approximately 1,800 first-year tubers, representing 8 progenies, were received from R. V. Akeley. In addition to a poor stand, late blight became epidemic in this planting and consequently it was impossible to evaluate the seedlings for resistance to insects. Approximately 90 percent of the seedlings were killed prematurely by late blight. Nevertheless, all of them were harvested about 3 percent were saved for further testing in 1957.

Twenty-one selected seedlings were planted in 25-hill plots and observed for leafhopper and late blight resistance. The data are summarized in Ohio table 1. Some of the seedlings were resistant to leafhoppers and some to late blight, but only in a few instances were seedlings resistant to both pests. Seedlings OB 3931-1 and OB 3957-2 were the best from the standpoint of foliage condition.

Ohio table 1.--Leafhopper and late blight resistance in selected seedlings. Wooster, Ohio, 1956.

Pedigree number	Parentage	Late blight classes <u>1/</u>	Hopperburn classes <u>2/</u>
B 3591-1	OB 2423-2 x Saranac	5	1
" -2	" x "	3	1
" -3	" x "	2	2
" -4	" x "	1	1.5
" -5	" x "	1	2
" -6	" x "	3	2
B 3593-5	OB 2423-2 x Katahdin	3	3
B 3594-1	" x B 2968-31	5	3
" -6	" x "	5	2
B 3595-5	Katahdin x OB 2905-1	5	2
" -7	" x "	3	3
OB 3596-1	OB 2586-2 x Saranac	5	1
OB 3612-1	(X792-88) x B 1299-15	5	1
OB 3931-1	OB 2586-2 x Katahdin	1	1
" -2	" x "	5	2
" -3	" x "	5	2
OB 3932-1	OB 2586-2 x OB 3022-1	5	2
OB 3932-2	" x "	2	2

continued

Ohio table 1, continued.

Pedigree number	Parentage	Late blight classes <u>1/</u>	Hopperburn classes <u>2/</u>
OB 3932-3	OB 2586-2 x OB 3022-1	5	2
OB 3957-1	Ac. 25953 x Teton	1	1.5
" -2	" x "	1	1.5
Irish Cobbler	" x "	5	5

1/ Late blight classes: 1, no lesions; 2, occasional lesion; 3, one-half leaves infected; 4, nearly all leaves infected; 5, plants dead.

2/ Hopperburn classes: 1, none; 2, trace; 3, light; 4, medium; 5, heavy.

More than 125 interspecific hybrids were received from Drs. Hougas, Kehr, and Buck. Many of these were highly resistant to the potato leafhopper, especially those involving chacoense, schickii, gibberulosum, macolae, and boergerii. These species, along with polyadenium, caldasii, and commersonii, are known to be highly resistant to attack by the potato leafhopper.

Thirty advanced seedling selections were tested for yield and tuber quality. One-fourth of these were retained for further trial.

PENNSYLVANIA

J. S. Cobb

The University Farm tests were made with 50-foot rows, 34 inches apart, and seedpieces were spaced 10 inches apart and replicated 4 times in randomized blocks. Sod and manure were plowed down on a sandy loam soil, and 1,500 lbs. per acre of a 5-10-10 fertilizer was applied per acre. The early varieties were planted May 9, the medium May 18, and the late May 25. The season was wet and cool, with rainfall of 6.65 inches for May, 5.05 inches for June, 5.95 inches for July, 9.02 inches for August, and 5.00 inches for September. The soil temperature at 5-inch depth varied from 55°F. in May to 80°F. in August and September. The tops were killed by frost September 21. Digging was started on September 23 and completed October 1.

Late blight that occurred the latter part of August was partly responsible for the low yields presented in Pa. table 1. The varieties most resistant to this epiphytotic were Merrimack, Boone, B 355-35, Cherokee, Saco, Essex, Ontario, Kennebec and Canoga in descending order.

The test for yields and total solids in Pa. tables 2 and 3 were conducted under varying conditions in 7 counties within the State. All plots were 40-foot rows replicated 4 times and randomized within blocks. This information was prepared by the Extension Sections of Agronomy, Agricultural Economics, Entomology and Plant Pathology, in cooperation with the Agronomy staff of the Agricultural Experiment Station.

Pa. table 1.--Potato variety test, 1956, University Farm. Yield in cwt. per acre, U. S. No. 1 tubers.

Variety	Average yield	U.S.No.1	D.M.
	Bu.	Pct.	Pct.
<u>EARLY VARIETIES</u>			
Antigo	256	91	15.6
Bliss	287	78	15.2
B 595-76, U.S.D.A.	336	96	-
Cobbler, U.S.D.A.	340	89	17.4
Cobbler, N. Y.	353	89	17.2
Cherokee, U.S.D.A.	410	91	17.2
Cherokee, N. Y.	264	74	16.5
Chippewa	283	82	15.0
Delus, U.S.D.A.	337	96	19.4
Early Ohio	246	68	16.3
Early Rose	146	69	18.2
Plymouth, U.S.D.A.	315	93	16.6
Osage	125	67	16.6
Osseo	224	91	16.2
L.S.D. .05 for varieties	53		

continued

Pa. table 1, continued.

Variety	Average yield	U.S.No.1	D.M.
	Bu.	Pct.	Pct.
<u>MEDIUM VARIETIES</u>			
B 2368-4, U.S.D.A.	327	86	16.8
B 355-35, U.S.D.A.	444	90	16.0
B 605-10, U.S.D.A.	297	84	16.4
B 926-9, U.S.D.A.	315	79	14.8
Canoga, N. Y.	322	76	15.9
Green Mountain, N. Y.	352	85	17.7
Katahdin, E. S.	228	88	15.8
Katahdin, U.S.D.A.	302	94	15.7
Kennebec, N. Y.	422	82	16.2
Kennebec, U.S.D.A.	454	87	16.9
Merrimack, U.S.D.A.	389	92	18.5
Pungo, U.S.D.A.	450	91	16.2
Sebago, E. S.	299	89	15.5
Sebago, U.S.D.A.	233	83	15.6
Teton, U.S.D.A.	287	83	15.9
L.S.D. .05 for varieties	59		
<u>LATE VARIETIES</u>			
Boone	423	86	15.7
Russet Burbank	204	63	17.8
Essex	477	84	15.7
Ontario	432	89	15.7
Red Pontiac, Potter Company	379	94	15.0
Red Pontiac, N. Y.	309	89	14.9
Rukat	320	86	15.7
Russet Rural	211	75	16.7
Saco	571	87	16.8
White Rural	210	80	16.8
L.S.D. .05 for varieties	78		

Pa. table 2.--Results of 1956 Pennsylvania Extension Potato Variety Demonstrations, yield of 12 varieties in 7 counties.

Variety	Clear- ^{**} field	Erie [*]	Lacka- ^{**} wanna	Lehigh ^{**}	Schuyl- [*] kill	Somer- ^{**} set	York ^{**}	Aver- age
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
<u>TOTAL YIELD PER ACRE</u>								
Saco	572	844	614	636	1095	701	928	770
Red Pontiac	518	682	652	628	1049	643	793	709
Kennebec	365	783	548	474	823	614	722	618
Russet Rural	469	525	531	563	676	672	729	595
Rukat	476	541	434	520	832	562	650	571
Delus	390	652	486	461	567	499	612	524
Katahdin	274	625	483	512	671	463	633	523
Irish Cobbler	351	637	390	515	549	504	676	517
Antigo	320	434	468	444	525	425	639	465
Merrimack	397	389	415	393	577	516	541	461
Cherokee	270	522	468	329	393	441	545	424
Osage	259	443	271	314	389	401	477	365
<u>U.S.No.1 YIELD PER ACRE</u>								
Red Pontiac	414	627	592	565	839	527	714	611
Saco	400	574	576	490	580	449	548	517
Russet Rural	417	515	492	512	561	578	525	514
Rukat	347	471	404	489	774	495	585	509
Delus	281	593	468	378	471	379	483	436
Katahdin	225	513	452	440	456	366	411	409
Kennebec	139	454	515	175	576	436	498	399
Antigo	250	412	436	355	467	383	447	393
Merrimack	270	342	370	338	508	459	460	392
Irish Cobbler	288	573	352	309	395	363	345	375
Cherokee	205	370	412	247	240	370	343	312
Osage	155	430	217	254	319	317	391	298

* Planted 32 inches between rows.

** Planted 34 inches between rows.

Seedpieces planted 9 inches apart in row.

Pa. table 3.--Results of specific gravity tests in percentage total solids of potato varieties, 1956 Pennsylvania Extension Potato Variety Demonstrations.

Variety	Clearfield County	Erie County	Lackawanna County	Lehigh County	Schuylkill County	Somerset County	Sullivan County	York County	Average ^a
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Merrimack	21.2	17.2	19.9	19.4	19.1	22.7	"	19.2	19.9
Delus	21.6	18.9	19.1	18.0	19.2	21.2	"	20.4	19.9
Russet Rural	20.8	16.7	21.8	19.1	18.4	22.0	17.7	18.9	19.7
Saco	19.7	18.4	18.9	19.2	18.9	20.2	"	18.9	19.1
Irish Cobbler	19.1	17.4	17.5	18.6	17.7	19.7	"	17.4	18.2
Kennebec	18.6	16.9	17.5	18.4	18.2	19.9	18.2	17.7	18.2
Osage	19.7	17.2	17.5	18.0	16.9	20.4	"	17.4	18.2
Cherokee	18.9	16.7	17.4	19.1	17.4	20.4	"	17.4	18.2
Rukat	18.0	15.1	17.4	17.7	17.2	18.9	16.0	16.7	17.4
Katahdin	16.9	16.0	17.2	17.7	16.3	19.2	16.3	16.7	17.2
Antigo	16.9	16.7	17.2	17.5	16.0	18.9	"	16.5	17.2
Red Pontiac	16.9	14.1	15.3	16.9	15.7	17.4	14.7	14.1	15.7
Russet Burbank	"	18.9	"	"	"	21.2	19.2	"	19.7
White Rural	"	"	18.2	"	"	"	18.4	"	18.2
Sebago	"	"	16.9	"	"	"	"	"	16.9
Osseo	"	"	16.7	"	"	"	"	"	16.7
Redkote	"	"	15.7	"	"	"	16.3	"	16.0

Specific Gravity is the best measure of starch and dry matter in potatoes. The method used for determining specific gravity is to weigh a few pounds of tubers out of water and in water. The relation between their weight and the weight of an equal volume of water is the specific gravity of the tubers. The higher the specific gravity of a tuber, the mealier it will cook.

Tubers high in specific gravity are best for baking, because they give a mealy product. Tubers having medium to low specific gravity are best adapted for boiling or frying. The specific gravity varies with growing conditions as well as with variety.

PENNSYLVANIA

Paul Grumm and Dolores McHugh

Nature of the Reproductive Isolations Among Diploid Species of Solanum.

The purpose of this part of the program is to determine the relative ease with which diploid species can be intercrossed, as well as the fertility of the hybrids and hybrid derivatives. Such information should be useful in aiding in the objective delimitation of the species and in clarifying the natural species groupings as an aid to breeding work, and should supply unique material for study of evolution within the complex Tuberarium section.

The original material consisted of representatives of 30 species including 18 in the Tuberosa section, 1 in the Demissa, 2 in the Cardiophylla, 1 in the Bulbocastana, 7 in the Commersoniana, 3 in the Pinnatisecta, 1 in the Polyadenia, and 2 in the Megistacroloba. These were supplied through the cooperation of Dr. R. W. Hougas from the collection of the U. S. Department of Agriculture maintained at Sturgeon Bay, Wis. During the 1956 season 1,957 crosses were made among these species, and of these 547 resulted in a set of seed balls. Counts were made of seed per ball set, and determinations of germinability and performance of the hybrids will be made.

A technique was perfected for making controlled crosses under field conditions when insect vectors are present. It consists of emasculation and pollination of the female flower in a late bud stage, followed by covering with a piece of large-sized soda straw which can be pinched at both ends to keep insects out. When pieces of straw about five-eighths of an inch long are used they do not weigh down the flower excessively.

Preliminary analysis of the present data show the presence of two barriers to crossings between members of the Tuberosa and Commersoniana sections. Members of these sections can be crossed with ease to produce a good set of seed. From an evolutionary viewpoint it is of interest that barriers have started to appear. These consist of a slight reduction in set of seed balls per cross attempted when crossings made between sections are compared with within-section crossings, and a reduction in seed per ball set in between-section as compared with within-section crossings.

S. polyadenium is very effectively isolated from the other species as revealed by a general failure of attempts at hybridization. The isolation was equally evident whether polyadenium was used as the male or female parent. In 170 attempted crossings of this species with members of the Tuberosa and Commersoniana, as well as 25 with S. pinnatisectum, 9 with S. cardiophyllum, and 10 with S. verrucosum, only 3 succeeded. These produced a few seed of the combinations S. polyadenium x macolae, x Rybinii, and x gibberulosum. It will be of interest to see whether these hybrids can be used as a means of introducing polyadenium genes into S. tuberosum.

Too few crossings have been made to date to evaluate the relative crossability of the members of more distantly related sections. It does appear that at least one member of the Megistacroloba, S. raphanifolium, can be readily crossed with members of the Tuberosa and Commersoniana.

PENNSYLVANIA
W. R. Mills

The usual potato-breeding work, as described in previous reports, was continued in 1956. Particular emphasis is placed on resistance to late blight and chipping quality; the hybridizing program is designed to combine and enhance these qualities. Selected varieties were tested for yield and adaptation in northern, central, and eastern Pennsylvania (Potter, Centre and Lehigh counties, resp.).

Blight

For the first time in several years, blight was present over the whole State and was very destructive where not properly controlled. The plots in Potter and Lehigh counties were grown as a part of farmer's fields. They were well sprayed and blight was insignificant. At State College, where no fungicide was used, blight appeared the last of July and was very severe by August 10. At that time, blight was found only on the varieties recessive for the R genes (Cobbler, Katahdin, Russet Rural, etc.), and the R_1 differentials. Isolations of Phytophthora infestans from Katahdin proved to be race 4.

On August 16, a few scattered blight lesions were found on Black's R_3 differential, 1253a(12). At the same time, an occasional lesion was found on R_2 and R_2R_1 genotypes. There were 14 such selections in the field, 25 hills of each. Scattered lesions were found on 4 of the 14 varieties. By this time, Katahdin and other "susceptible" varieties were almost defoliated. No blight could be found on R_1 , R_1R_2 or R_1R_4 selections.

On September 10 a very light infection was seen on Keswick and Kennebec and on the R_1R_4 differentials. Both of the named varieties were nearly mature at this time and were dead within a week. A late-maturing R_1R_4 differential, very green at this time, was a mass of blighted leaves and stems within the next few days and completely killed by September 25.

In the same field were about 100 selections (25 hills each) of the genotype R_1R_2 , as well as about 6,000 single-hill seedling selections carrying the same major genes. None of these developed any observable blight to October 1 when the vines were mechanically killed.

Blight Tests in Mexico

Cooperative with J. S. Niederhauser, Rockefeller Foundation, and R.-W. Hougas, Inter-Regional Potato Introduction Project.

Crosses were made at the Potato Introduction Station, Sturgeon Bay, Wis., between clones of Solanum demissum, selected for high resistance to late blight, and 13 diploid species, in an attempt to obtain resistant tetraploid hybrids useful in breeding blight-resistant varieties. Certain of the F_1 's were then crossed to S. tuberosum var. Katahdin, and to S. stoloniferum.

A total of 229 clones, consisting of 110 F_1 selections, 50 crosses with *S. stoloniferum*, and 69 crosses with Katahdin were planted in the Toluca Valley, Mexico, where they were evaluated for resistance to late blight. In most cases, there were 4 plants per clone. The scale used by Niederhauser was employed: 0 = no infection; 1 = very few (1-5) lesions; 2 = slight infection; 3 = moderate infection; 4 = severe infection and 5 = dead. Four readings were made between July 20 and August 23. The final estimation of resistance was made on the basis of the greatest amount of infection noted.

The percentage of the various hybrids placed in each blight class are shown in Mills table 1.

Mills table 1.--Percentage hybrids in different late blight classes.

	Blight Rating					Total clones
	1	2	3	4	5	
F_1 (<i>S. demissum</i> x diploid spp.)	13	53	23	10	1	110
F_1 x <i>S. stoloniferum</i>	14	60	14	4	8	50
F_1 x Katahdin	0	9	7	16	68	69

After the first reading, no selection was blight free; that is, none was immune. However, high resistance (rating of 1 or 2) was noted in 66% of the 110 F_1 selections. These plants never showed more than a few scattered lesions, which were limited to the bottom leaves. Only one clone was killed by blight.

Thirty-eight different F_1 selections were crossed with Katahdin, and from the 38 families, 69 selections were tested. The shift toward susceptibility in these triple hybrids is abrupt. Only 9 percent (6 selections) exhibited a degree of resistance sufficiently high to serve as parents in further crossing, whereas 84% possessed little or no resistance.

Sixteen different F_1 selections were crossed with *S. stoloniferum*. Resistance of 50 selections from these crosses was determined. On the average, these triple hybrids were as resistant as the F_1 's, and in several cases the hybrid was more resistant than its F_1 parent.

There was also included in the test 64 clones of *S. andigenum*, from which it was hoped to find some minor gene resistance. No appreciable resistance was found in this collection. Many were killed by July 20 and by August 7 the remainder were either severely blighted or dead.

In addition to the Wisconsin material, a large number of single-tuber selections from the Penn. State breeding program were tested. There were 2 kinds of material:

1. Sixty clones possessing major genes R_1R_2 or $R_1R_2R_4$ which had been rated, on the basis of greenhouse tests with a virulent race 1, 2, 4, as highly resistant.
2. About 4,000 seedlings, survivors of screening with a mixture of races 1, 2 and 2, 4, but unselected for "field resistance". In the majority of the

families, one or both parents had exhibited resistance in greenhouse tests with race 1,2,4.

The resistance found in these selections was very slight. None of the 60 clones selected in Pennsylvania for resistance to race 1,2,4 rated better than 4 in Toluca, while most of them were killed by August 6. The 4,000 unselected seedlings fared little better. On August 6, 173 seedlings were rated from 2 to 4; the remainder were dead or nearly so. According to communications from Niederhauser, most of the "resistant" seedlings became more susceptible as they matured.

From the standpoint of high field resistance, the Wisconsin triple hybrids (S. demissum x diploid supp. x S. stoloniferum) look encouraging. It seems probable that a new source of resistance has been added to that originating with S. demissum. A large number of the hybrids which were rated 1 or 2 in Mexico have been obtained from Dr. Hougas, and attempts to cross them with S. tuberosum selections will be made.

RHODE ISLAND
J. E. Sheehan

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23 varieties and one numbered selection were included in 1956 in the potato variety trials at the Rhode Island Agricultural Experiment Station. The test plots had been in a grass-legume sod for the previous 2 years. The soil is classified as Bridgehampton, very fine sandy loam. Granular calcium cyanamide was broadcast on the plots before plowing at the rate of 200 lbs. per acre. An 8-12-12-2 low chloride fertilizer at 2,000 lbs. per acre was applied in bands at planting time.

Yields were calculated from 32-foot rows replicated 3 times for a total of 4 plots for each entry. Seedpieces were spaced 1 foot apart in the row, except one set of Russet Burbank which was spaced 18 inches apart. The distance between rows was 36 inches. All varieties were planted on April 20 and harvested October 1 except the Cobblers which were dug September 24.

R. I. table 1 gives a summary of the weather data from April through September at Kingston. March rainfall, not shown, was exceptionally well distributed and nearly one-half inch above normal, indicating adequate soil moisture at the outset of the growing season.

R. I. table 1.--Rainfall and temperature for the 1956 growing season at Kingston, R. I.

	Temperature					
	April	May	June	July	Aug.	Sept.
	°F	°F	°F	°F	°F	°F
Normal	44.5	55.0	63.6	69.2	68.0	61.9
Actual	42.9	52.6	65.6	68.3	68.6	59.6
Departure	-1.6	-2.4	+2.0	-0.9	+0.6	-2.3
	Precipitation in Inches					
Normal	4.63	3.86	3.46	3.34	4.30	3.90
Actual	3.31	2.51	2.31	6.96	1.07	2.96
Departure	-1.32	-1.35	-1.15	+3.62	-3.23	-.94

While below normal most of the growing season, rainfall, nevertheless, was well distributed. Temperatures for the same period, April through September, were generally below average totaling 0.77° below the mean.

The 1956 potato season was one of the best that Rhode Island growers have witnessed in the past several years from the standpoint of yield and quality. Undoubtedly the cool summer and uniform distribution of rainfall played a major role in the high quality and yield. R. I. table 2 lists the yields and other data from the selections tested. Saco yielded 848 bushels per acre, significantly outyielding all other varieties except Kennebec, Sequoia, and Russet Rural. Russet Rural was the leading variety in total solids followed by Saco, Mohawk, Merrimack, Delus, Sequoia and Keswick. As in the past, there was no correlation between yield and dry-matter content.

R. I. table 2.--Yield and other data for 24 potato varieties grown at Kingston, R. I., 1956.

Variety	Yield per acre		Dry matter	Days to maturity	Size	Skin and shape	
	U.S. No. 1						
	Bu.	Pct.	Pct.				
Saco	848	98	20.8	148	Large	Smooth	Irregular
Kennebec	827	98	19.5	148	"	Smooth	Regular
Sequoia	716	98	20.3	158 ^{1/}	"	"	"
Russet Rural	677	99	22.3	145	Medium	Russet	Regular
Teton	654	98	19.1	147	"	Smooth	Regular
Chippewa	638	98	17.8	147	Large	"	"
Pontiac	628	97	17.2	147	"	"	"
Sebago	626	98	20.0	158	"	"	"
Mohawk	606	99	20.7	147	Medium	Rough	Regular
Ontario	592	95	19.6	143	Large	Smooth	Regular
Katahdin	585	97	18.7	147	"	"	"
Menominee	531	98	19.7	137	"	Rough	Regular
Plymouth	525	98	19.0	129	"	"	"
Irish Cobbler	515	99	18.4	123	"	"	"
Green Mountain	510	94	19.4	158	"	Rough	Irregular
Pungo	497	99	19.3	137	"	Rough	Regular
B 2368-4	489	97	18.5	137	"	Smooth	Regular
Warba	486	98	19.6	123	Medium	Smooth	Irregular
Dulus	486	99	20.6	133	Large	Smooth	Crabgrass
Erie	471	96	19.0	137	"	Rough	Regular
Russet Burbank ^{2/}	467	95	19.8	148	"	Russet	Regular
Russet Burbank	463	93	19.9	148	"	"	"
Cherokee	442	97	19.6	128	Medium	Smooth	Regular
Keswick	362	98	20.1	123	Large	"	"
Merrimack	358	97	20.7	153	Medium	Rough	Regular

L.S.D. at .05 175 1.02

^{1/} Vines still green at harvest.

^{2/} Spaced 18"; all others spaced 12".

Saco continues to be one of the top-yielding high dry-matter varieties in the trials but it produces many bumpy irregular tubers. Most are not sufficiently off-shape to disqualify but are definitely inferior in eye appeal when compared with a more uniformly shaped variety. Saco may be suitable for certain food processes which require high dry matter but not necessarily uniformly shaped tubers. Nearly every variety produced somewhat larger tubers this year than they ordinarily do. Varieties usually producing large tubers produced many "Jumbos" this year. Another frequent occurrence this season was the unusual amount of russetting or rough skin approximating russetting on many varieties. Conditions evidently were ideal for the russetting factor.

Disease and insect damage appeared to be rather minor throughout the season. The major insect damage was caused by flea beetles followed by corn borers and aphids. Early and late blight were of no consequence. The corn borer was fairly abundant throughout the State in potato vines and was easily distinguished.

especially on hot days, by wilted leaves on infested vines. The spray interval was determined by insect hatch cycles and field counts of population. Fungicide was added according to weather conditions favoring blight.

Chemicals used were 50% wettable DDT powder for the corn borers, Dieldrin 50% wettable powder for other insects, malathion for aphids and leafhoppers, and Parzate for fungus. DDT was applied at 2 lbs. per acre, Parzate 2 quarts per acre, Malathion 2 lbs. per acre, and Dieldrin at $\frac{1}{2}$ lb. per acre. All chemicals were applied in 100 gallons of water per acre.

SOUTH CAROLINA

Wm. M. Epps

Objective: Comparison of potato varieties for adaptation to conditions in Coastal South Carolina.

Methods: Soil, sandy loam; fertilizer, 1,650 lbs. 6-8-6; planted, February 8. Randomized block, 5 replications, single-row plots 36 ft. 4 in. long. Seed spaced at 42 per plot. Harvested, June 5, 1956.

Records: Stand counts taken April 19. A 5-pound sample from each plot weighed in air and in water for specific gravity readings. Dry matter calculated from formula $DM=214 (S.G. - 0.988)$. Large tubers from each variety were cut and examined for internal discoloration.

Weather conditions: The early season was favorable for rapid emergence. A series of frosts in late March cut back the young plants causing a serious yield reduction. Plant growth was only moderate. The growing season was dry throughout, necessitating three irrigations during April and May. Diseases and insects were not a factor in determining yields.

Results: (S. C. table 1). The hot summer weather of late May apparently caused a cessation of tuber growth before the late varieties, such as Sebago, had time to make maximum yields. The early and midseason varieties were affected to a smaller degree and made more nearly normal yields.

Boone and B 75-4, produced a poor stand, averaging only 30.2 and 8.8 plants per plot, respectively. The stands of the other varieties were satisfactory, varying from 37.4 to 41.8 out of a possible 42 plants per plot. B 75-4 was early and produced tubers of excellent appearance but, for the second consecutive year, failed to produce an adequate stand.

A trace of mild internal drought necrosis was found in Sebago. All other varieties were free of internal discoloration.

B 73-3, B 605-10, Delus, and Cherokee appeared best suited to South Carolina conditions. All 4 were earlier and had a higher dry-matter content than Sebago, and in 1956 produced higher yields. The appearance of the tubers of all 4 were satisfactory. Commercial growers who have planted Cherokee have found the tubers to be somewhat rougher than desired, especially when grown on the heavier potato soils or when harvest was delayed much past June 1.

B 69-16, which produced the highest yields in 1956, was previously discarded because of its extreme susceptibility to handling injury and exposure scald. The 1956 handling tests were unsatisfactory because of unfavorable weather conditions.

Summary: The new varieties B 73-3, B 605-10 and Delus tested in South Carolina in 1956, appeared to be worthy of larger scale trials.

S. C. table 1. A comparison of varieties of potatoes tested at Charleston, S. C., 1956.

Variety	Yield per acre	Dry matter	Stand (plants/plot)	Matur- ity	Shape	Appearance
	Bu.	Pct.				
B 69-16	435	18.2	41.2	M	Round	Excellent
B 73-3	376	20.5	41.8	ME	Oval	Good
Plymouth	361	19.1	41.2	ME	"	Fair
B 605-10	360	19.1	41.6	E	Round	Good
Cherokee	347	18.9	39.8	ME	"	"
I. Cobbler	332	20.0	41.0	E	"	Fair
Delus	324	20.8	40.4	M	Oval	Good
Sebago(Maine)	313	18.0	39.5	L	"	Excellent
B 920-7	311	17.8	41.4	VE	Long	"
Sebago (PEI)	301	17.8	37.8	L	Oval	"
Boone	277	16.0	30.2	L	"	Good
Early Gem	263	16.7	38.6	E	Long	Fair (Russet)
Idaho Russet	249	18.7	--	L	"	" "
Bliss	237	16.9	39.2	VE	Round	" (Red)
B 579-3	212	17.6	37.4	L	Long	Excellent
B 991-14	153	19.2	39.0	VE	Oval	Good
B 75-4	56	19.4	8.8	E	Long	Excellent
L.S.D. 5%	41.6	.63	2.8			
1%	55.	.83	3.7			

Use of Pre-Cut Potato Seed

Objective: To determine the effectiveness of potato seed cut several months ahead of planting.

Methods: Varieties, Katahdin, Kennebec, Sebago, and Green Mountain.

Cutting Dates: September 10 (immediately after harvest), October 10, November 10, December 10, January 10 and February 15 (freshly cut). The pre-cut seed was cut in Maine and shipped to South Carolina in February. The last lot (February 15) arrived whole and was cut just prior to planting as a check.

Plot Plan: Single-row plots, each was 24 seedpieces spaced 12 inches apart. Four replicates. Four varieties randomized within the block, the cutting dates within the varieties by the split-plot method. Planted: February 15 on light sandy loam soil. Fertilizer: 1650 lbs. 6-8-6 under the crop. Harvest: June 4.

Conditions: A late March frost cut back the plants and resulted in a considerable reduction in yield and tuber size. Inadequate rainfall was supplemented as needed by irrigation.

Results: See N. C. table 2. Stands, growth, and yields were quite uniform except in the plots planted with freshly cut seed. The freshly cut Sebago plots showed a reduced stand, poor growth, and a greatly reduced yield. The freshly cut Kennebec plots had a few missing hills, but growth and yields were not affected significantly. The yield from the freshly cut Katahdin seed was slightly below that from other plots of this variety. In Green Mountain, neither stand, growth nor yield appeared to be affected by cutting date.

Katahdin and Kennebec produced statistically higher yields than Sebago and Green Mountain.

✓ Summary: Potato seed pre-cut during the months between harvest in September and planted in February appeared at least equal or slightly superior to freshly cut seed of Katahdin, Kennebec and Green Mountain, and definitely superior to freshly cut Sebago seed.

N. C. table 2. Stands and yields of 4 varieties of potatoes cut at monthly intervals between September and February.

Cutting date	Stand (Plants per 4 plots)					Yield per acre				
	Kat.	Ken.	Seb.	G.M.	Avg.	Kat.	Ken.	Seb.	G.M.	Avg.
Sept. 10	95	94	96	96	95.3	255	253	248	198	238
Oct. 10	96	96	93	96	95.3	255	238	210	203	226
Nov. 10	96	95	95	95	95.3	268	258	215	208	237
Dec. 10	96	95	95	96	95.5	258	260	215	195	232
Jan. 10	95	95	96	96	95.5	270	235	220	208	233
Feb. 15	96	91	84	95	91.5	243	248	150	205	211
Avg.	95.7	94.3	93.2	95.7	--	258	248	210	203	--

TENNESSEE (CROSSVILLE)

T. R. Gilmore

1956 was a good year for potato production in Tennessee. Thirteen varieties and seedlings were planted in a replicated yield plot, (See Tennessee table 1.).

Tennessee table 1.--Yield test at Crossville, Tenn., 3 replications of 25 hills.

Seedlings or varieties	Parentage	Yield
		U. S. No. 1
		Bu.
T.L. 1859	Pontiac x 96-56	642
1859 N.D.	Pontiac x 96-56	640
T.L. 3674	B 446-54 x Teton	608
T.L. 3769	Kennebec x B 522-33	580
Kennebec		574
T.L. 4893	I1028 x B81-T	546
La Soda		542
T.L. 4074	B607-37 x B 607-56	493
Boone		448
T.L. 4454	B446-54 x Teton	406
T.L. 4411	B606-37 x B56-1	352
T.L. 4112	Kennebec selfed	315
Triumph		221

L.S.D. at 5% = 85 bushels

All seedlings and varieties were planted with seed potatoes grown at Crossville, Tenn., in 1955, with the exception of one lot of seedling 1859. These came from North Dakota and were used as a check to Tennessee-grown seedling 1859. This year there was no difference in yield of this seedling variety from the Tennessee- and North-Dakota-grown seed.

In most years northern-grown seed will outyield Tennessee-grown seed.

TEXAS (Prairie View)
J. M. Coruthers

In the spring of 1956, 20 varieties were planted at Substation 18 to test for yield and market qualities. The crop suffered from lack of moisture and high temperature, especially in the latter part of the growing season. Tubers were smaller than usual, and the number of culls was high. The crop was not irrigated. There was some variation in variety yields under the unfavorable growing conditions.

Facts concerning the experiment are as follows:

Location: Prairie View, Tex.	Planting Date: February 25, 1956
Soil: Hockley Fine Sandy Loam.	Harvest Date: June 1, 1956
Plot Size: 30 feet x 38 inches.	Insecticide: 10% D.D.T.
Plot Design: Randomized Block.	Fertilizer: 600 pounds 5-10-10 per
Seed Source: Supplied by Dr. F. J. Stevenson, Horticultural Crops Research Branch, U.S.D.A. and Dr. T. P. Dykstra, U.S.D.A., L.S.U., Baton Rouge, La.	acre applied in bed.

Teton, White Rose, Delus, Pontiac, Cherokee, and Kennebec were highest in yield of marketable potatoes (U.S. No. 1. and U.S. No. 2.) as the results show in Coruthers table 1.

Variety	U.S. No.1	U.S. No.2	Culls	Total
	Bu.	Bu.	Bu.	Bu.
Cherokee	64.0	35.9	48.7	148.4
Boone	47.9	26.7	32.9	107.5
Merrimack	53.7	41.5	32.9	128.0
Red LaSoda	38.4	43.7	52.2	134.3
Green Mountain	29.9	42.2	37.4	107.6
White Rose	58.3	56.2	54.3	168.7
Irish Cobbler	31.1	53.1	17.4	101.6
Marygold	27.0	22.4	34.1	83.5
Saco	53.3	31.0	51.6	135.8
Delus	77.8	29.2	70.7	177.7
Triumph	21.2	22.0	35.9	79.1
Pungo	22.7	43.4	32.3	98.4
Katahdin	44.3	22.3	68.8	135.4
Mohawk	56.2	38.0	60.2	154.4
Early Gem	23.5	30.8	49.7	104.1
Chippewa	40.3	34.8	24.5	99.6
Pontiac	71.1	34.8	50.8	156.7
Kennebec	58.3	37.6	31.9	127.3
Plymouth	41.1	44.1	51.2	136.5
Teton	65.9	50.2	16.2	132.4
L.S.D. 5%				11.0
L.S.D. 1%				14.0

TEXAS (Weslaco)

Paul W. Leeper

Irish Potato Variety and Breeding Line Evaluation Tests

Fall Tests - 1955

One plant-spacing and 3 variety tests were conducted during the fall of 1955. Commercial varieties and advanced potato-breeding lines, furnished by potato breeders throughout the United States, were tested.

Seed potatoes for the tests from all but 8 of the lines were saved from the spring tests of 1955 and stored under refrigeration from April until late September. Eight lots were received from Nebraska.

Excessive rains during September and early October delayed planting of all tests until October 12, which is almost a month later than the usual planting date. Growing conditions thereafter were not generally favorable.

Seedpiece rot after planting resulted in poor stands of a number of the varieties. This trouble is often experienced in growing fall potatoes in this area. Freedom from seedpiece rot may be one of the determining factors in selecting a variety for the fall season. The varieties 1859 and Red Pontiac were relatively free of seedpiece rot, whereas Sheridan and Redglo rotted severely.

Test I - Forty-two varieties and advanced breeding lines were included in this test. Of the red varieties, 1859 and Red Pontiac were outstanding. Although 1859 outyielded Red Pontiac slightly, it had deep eyes, was fairly rough, and did not have the desirable red color of Red Pontiac.

Although Kennebec produced the largest yields of the white varieties, these yields were low compared with those of 1859 and Red Pontiac.

Yields in bushels per acre are given by varieties, market grades, and sizes in Texas table 1.

Test II - Red Pontiac produced the best yields of the 12 varieties and breeding lines in this test. None of the breeding lines produced high enough yields to be considered for commercial production. Yields by varieties, market grades, and sizes are given in Texas table 2.

Test III - Of the 36 varieties and breeding lines included in this test, only 205.49-1 produced significantly greater yields of potatoes than did Red Pontiac. Four others, 93.48-1, 215.50-2, Redglo, and 148-48-3, produced good yields and will merit further testing. Yields from this test are given by varieties, market grades, and sizes in Texas table 3.

Spacing Test - Five planting rates were used in this test. Seedpieces were planted at intervals of 3, 6, 9, 12, and 15 inches. A 6-inch spacing between seedpieces produced the largest yields. Yields by spacings, market grades, and sizes are shown in Texas table 4. It is interesting to note the almost equal gain in marketable yield with each decrease in plant spacing from 15 inches to 6 inches. In a spacing test conducted in the fall of 1954, a 9-inch spacing gave a larger yield of the 1 7/8 inches and larger size but less of the B size. Results of these 2 spacing tests indicate that the optimum spacing would be between 6 and 9 inches.

Spring Tests - 1956

Five variety and a source-of-seed potato tests were planted in the Spring of 1956 on the Bob Allen Farm near Raymondville, Texas. All tests were killed by salt. Rains during the late summer months created an unusually high water table under the field. The salt condition did not develop in the field until the following spring after the potatoes had been planted.

Texas table 1. Yield per acre by varieties, market grades and sizes, fall test, 1955.-

Variety	Yield U. S. No. 1 per acre					Remarks
	1 7/8"	1 1/2 to	Total	Culls	Total	
	& over	1 7/8"	market- able		yield	
	Bu.	Bu.	Bu.	Bu.	Bu.	
1859	195	21	216	11	227	Light red, no scab
Red Pontiac	184	25	209	9	218	Red, very little scab
20.44-2	34	20	53	14	68	Dark red, no scab
2774-2R	122	18	139	17	157	Dark red, smooth, no scab
4753	17	34	52	28	79	Light red, no scab
42.51-3	124	27	150	12	163	Red, no scab
4893	52	22	74	8	82	Red, no scab
204.43-1	18	8	26	5	31	Red, no scab
Dazoc	39	21	61	16	77	Red, no scab
I-9100-3L	34	6	41	2	42	White, no scab
4817	90	34	124	20	144	Red, smooth, no scab
Kennebec	80	13	93	6	99	White, no scab
La Soda	123	17	140	9	149	Light red, little scab
2368-4	99	14	113	11	124	Light red, no scab
82-94	59	17	76	10	86	Bright red, scab
E. Gem	15	10	26	9	35	White russet, no scab
3203-6RM	49	32	81	25	106	Red, scab
2799-5R	101	29	130	14	144	Dark red, little scab, smooth
457-1-10E	9	2	11	8	12	White, no scab
4735	58	14	72	7	79	White, no scab
4811	67	15	81	10	91	Light red, smooth
457-1-36L	38	6	43	2	45	White, smooth
82-269	57	11	67	9	76	Red, no scab
3309-8	64	27	91	15	106	Red, smooth, no scab
457-1-35	88	7	95	4	99	White, no scab

(continued)

Texas table 1 continued

Variety	Yield U. S. No. 1 per acre					Remarks
	1 7/8"	1 1/2 to	Total	Culls	Total	
	& over	1 7/8"	market- able		yield	
	Bu.	Bu.	Bu.	Bu.	Bu.	
Red Kote	105	19	124	8	132	Light red, no scab
2124-2R	70	19	89	9	97	Dark red, smooth, no scab
3972	127	27	154	10	164	Light red, rough, no scab
73-10	40	13	53	7	61	White, no scab
Sheridan	28	10	38	8	46	Bright red, little scab
38.49-6	84	31	115	20	135	Pink, very smooth, little scab
2910-1R	52	14	66	11	77	Dark red, scab
20.42-1	31	24	54	23	77	Dark red, scab
3022-18M	72	5	78	3	81	White, smooth, no scab
2555-6RM	136	16	152	14	166	Dark red, smooth, no scab
38.42-3	84	30	113	17	131	Dark red, no scab
2774-3R	117	20	137	16	153	Dark red, smooth, no scab
4814	124	30	153	14	167	Light red, no scab
Cherokee	76	8	84	4	88	White, no scab
4101	48	18	65	13	78	White, scab
Bliss Triumph	75	29	104	17	121	Light red, scab
1354	92	20	112	14	125	Light red, smooth, no scab
L.S.D. at 5%	5.5	2.5	6.1	1.4	4.4	
1%	7.4	3.3	8.0	1.9	6.1	

1/ Planted October 12, 1955. Harvested January 17, 1956.

Texas table 2. Yield per acre by varieties, market grades and sizes, fall test 1955.

Variety	Yield U. S. No. 1 per acre					Remarks
	1 7/8"	1 1/2 to	Total	Culls	Total	
	& over	1 7/8"	market- able		yield	
	Bu.	Bu.	Bu.	Bu.	Bu.	
Bliss Triumph	16	7	23	6	29	Light red, scab
270.51-8	57	22	79	16	95	Dark red, scab
Red Pontiac	156	18	174	10	184	Red, scab
22.52-2	55	16	71	9	80	Very light, red, smooth, late, no scab
17.50-2	71	17	87	8	95	Very dark, red, scab
181.51-2	51	17	68	13	81	Dark red, severe scab, late
19.50-1	59	27	85	16	101	Red, scab
LaSoda	74	11	85	6	91	Light red, no scab
Redglo	54	11	65	6	71	Dark red, scab
215.50-1	97	9	106	8	114	Red, scab, smooth, med. late
320.48-1	95	15	110	4	114	Red, no scab
139.52-6	83	27	110	18	129	Light red, no scab
L.S.D. at 5%	9.5	4.0	10.2	2.9	10.2	1/Planted October 12, 1955.
1%	12.8	5.5	14.3	4.0	14.3	Harvested Jan. 17, 1956.

Texas

Table 3. Yield per acre by varieties, market grades and sizes, fall test 1955^{1/}.

Variety	Yield U.S. No. 1 per acre					Remarks
	1 7/8"	1 1/2 to 1 7/8"	Total market-able	Culls	Total yield	
	Bu.	Bu.	Bu.	Bu.	Bu.	
93.48-1N	0	0	0	0	0	
154.47-2	43	11	54	7	60	Red, scab
83.49-IN	14	4	18	4	22	Red, no scab
72.49-1	50	40	89	14	104	Dark red, no scab
154.47-2N	24	5	29	2	31	Red, no scab
205.49-1	146	22	167	8	175	Light red, little scab
195.51-3	29	17	46	9	55	Red, no scab
213.43-2	33	13	46	3	49	Red, no scab
195.51-1	46	12	57	10	67	Red, no scab
41.49-4	42	24	67	8	74	Dark red, scab
90.49-1	46	7	53	2	55	Red, no scab
76.50-3	96	11	107	7	114	Red, no scab
457-1-16E	0	0	0	0	0	
95.48-1	101	13	114	7	121	Dark red, scab
13.51-3	23	6	28	3	31	Light red, little scab
213.43-3	53	28	81	14	95	Red, scab severe
118.50-1	67	18	85	14	100	Dark red, scab
215.50-2	100	26	126	9	136	Red, little, scab
Redglo	61	20	81	9	90	Dark red, scab
20.51-10	58	24	82	8	90	Light red, scab
83.49-1	79	15	94	11	105	Red, scab
Redglo	133	22	155	12	167	Dark red, scab
148.48-3	106	25	131	17	148	Light red, late
222.50-4	84	32	116	22	137	Red, no scab
222.51-9	58	4	62	6	68	Red, scab
131.47-6	78	18	96	12	107	Red, scab
19.50-1	54	22	76	13	88	Red, scab
47.52-1	76	23	99	6	104	Red, no scab, smooth, late
107.52-13	33	18	51	17	67	Red, no scab
315.48-3	24	6	30	7	37	Red, no scab, late
26.44-1N	62	20	83	9	92	Red, no scab
226.49-IN	1	1	2	0	2	
95.48-1N	0	0	0	0	0	
223.48-1N	6	3	9	3	13	White, no scab
Sheridan	1	1	2	0	2	
Red Pontiac 117	19	19	136	8	143	Red, scab
L.S.D. 5%	25.9	6.6	28.7	3.9	30.9	
" 1%	34.7	8.8	38.6	5.0	41.3	

^{1/} Test planted October 12, 1955
Harvested January 17, 1956.

Texas table 4. Effect of planting rate upon yield, grade, and size of potato tubers^{1/}.

Plant spacing	Yield per acre				
	1 7/8" & over	1 1/2" to 1 7/8"	Total marketable	Culls	Total yield
In.	Bu.	Bu.	Bu.	Bu.	Bu.
15	86	13	100	4	104
12	108	18	126	10	137
9	133	27	161	11	172
6	163	34	197	16	213
3	143	55	197	30	227
L.S.D. 5%	3.2	5.3	10.0	3.2	12.8
" 1%	4.6	7.8	14.0	4.6	18.1

^{1/} The variety LaSoda was used in this test. Test planted October 13, 1955; harvested January 17, 1956.

TEXAS (Brownsville)

H. M. Meyer

One trial for potatoes was run near Brownsville with 15 lots of seed supplied by R. V. Akeley, Beltsville, Md. These selections carried resistance to both late blight and scab, 2 diseases that are most common to potatoes in the Lower Rio Grande Valley. The market quality of the seedling selections was checked with Pontiac, Triumph, and Sebago.

Only 4 of the 15 selections compared favorably with Pontiac in yield, color, and smoothness.

Seedling B 2368-4 (Pontiac x B 400-1) was probably the number 1 lot of the 4 selections. It yielded better than Pontiac, the eyes on the tubers are shallow, the skin has a bright attractive red color, and the vine is stock and vigorous.

Seedling B 2368-13 (Pontiac x B 400-1) has a strong vigorous vine which stands up well under the high winds that prevail during the growing season in the valley. It yielded as well as Pontiac; its skin color is a dull russet red which is objectionable.

Seedling B 3309-2 (B 874-108 x (B 2131-3) was the most wind resistant varieties tested. It yielded well, but is late in maturity. Its tubers have a beautiful red color and shallow eyes.

Seedling B 3643-2 (NDB 3018-2R x B 2997-9) is a high-yielding strain with very deep red tubers. Even the vines, especially the young growth, are red. This selection has no recorded disease resistance, but because of the high yielding ability and dark red color it will be retested at least another year.

VIRGINIA (Blacksburg)
P. H. Massey, Jr., and F. H. Scott

Fourteen potato varieties were grown and evaluated at the Virginia Agricultural Experiment Station in 1956. The experimental procedure and growing conditions were as follows:

Location	Blacksburg, Va.	Fertilization	1500 lb./A. of a 5-10-5. One-half broadcast and harrowed into soil, and the remainder applied in bands at time of planting.
Soil	Groseclose silt loam		
Soil pH	5.7		
Previous crop	Cover crop		
Plot size	30' x 3' (data taken on center 28 feet of each record row).	Planting date	March 28.
Plot design	Randomized block	Cultivation	Frequently enough to control weeds
Replications	4	Insecticides	DDT and Malathion
Tubers	Supplied by Plant Industry Station, Beltsville, Md.	Growing conditions	Quite favorable
		Harvest date	September 18.
Spacing	12 inches		

Saco yielded significantly more U. S. No. 1 potatoes than any other variety tested. Kennebec, Pungo, Katahdin, Merrimack, B607-56 and Delus yielded significantly more U. S. No. 1 tubers than Pontiac, Irish Cobbler, B605-10, Cherokee, B926-9 and B962-32. In general, Kennebec remains one of the best varieties for this area.

Merrimack was significantly higher in specific gravity than any other variety tested. This variety also had the highest specific gravity in the 1955 potato trial.

Massey table 1.--Yield per acre, specific gravity, and dry matter of 14 varieties of potatoes tested in 1956.

Variety or selection	Mean yield per acre			Mean specific gravity ^{1/}	Total solids
	U.S. No. 1	U.S. No. 2	Total		
	Bu. ^a 2/	Bu. ^b	Bu. ^a	^d	Pct.
Saco	584 ^a	151 ^b	735 ^a	1.076 ^{cd}	18.9
Kennebec	487 ^b	195 ^b	682 ^{ab}	1.077	19.2
Pungo	483 ^b	144 ^b	627 ^{abc}	1.078 ^{cd}	19.4
Katahdin	464 ^{bc}	45 ^c	509 ^{cd}	1.070 ^f	17.5
Merrimack	445 ^{bc}	75 ^c	520 ^{cd}	1.087 ^a	21.1
B 607-56	417 ^{bc}	145 ^b	562 ^{bc}	1.072 ^{ef}	17.9
Delus	382 ^{bc}	40 ^c	422 ^{de}	1.083 ^b	20.4
Plymouth	362 ^{cd}	55 ^c	417 ^{de}	1.073 ^{ef}	18.1
Pontiac	345 ^d	286 ^a	631 ^{abc}	1.064 ^g	16.2
Cobbler	278 ^{de}	141 ^b	419 ^{de}	1.070 ^f	17.5
B 605-10	269 ^{de}	84 ^c	353 ^e	1.071 ^f	17.6
B 926-9	232 ^e	79 ^c	311 ^e	1.065 ^g	16.4
B 962-32	95 ^f	58 ^c	153 ^f	1.080 ^{bc}	19.7
Cherokee	239 ^e	295 ^a	534 ^{cd}	1.075	18.6

1/ Specific gravity determinations made on 4 replications of 25 tubers each.

2/ The superscripts (a, b, and c) indicate the statistical significance of the yield figures at the 5% level. For example, in each column, data bearing an "a" superscript are significantly different from those not having an "a"; "b" significantly different from those not having a "b", etc.

WASHINGTON (Mount Vernon)
Martin W. Carstens

1956 was one of the most favorable growing seasons for many years. Temperatures were above normal through most of the growing season, moisture conditions were satisfactory, harvest season was dry, and frost occurred later than usual. Consequently, yields averaged above normal and the quality of tubers was high. In both early and late varieties vines cured slowly, giving excellent skin set which facilitated handling.

The disease picture in the Northwest is changing. Dithane treatments have been very effective in the reduction of blight damage and virus diseases are being reduced to a minimum with a carefully regulated insect control program. In the coastal area very satisfactory results have been obtained by the use of DDT, parathion, and malathion. Leaf roll is practically non-existent in certified seed plantings, and there is a very low percentage of mosaic. However, diseases such as Verticillium wilt and rhizoctonia are requiring a greater degree of control. There has been an increasing usage of Agrimycin and Phygon for seedpiece decay.

White Rose is still the leading early variety and Netted Gem the main late variety. Increasing acreage is being devoted to Kennebec, largely for the potato chip industry.

Carstens table 1 shows the varieties included in the 1956 trials and the average weight of marketable potatoes per plot. Due to the absence of late blight, no readings were obtained on the relative resistance of these varieties. Carstens table 2 includes USDA tuber selections for 1956. Very high specific gravities were obtained on some selections, and where the yield justifies, the selections will be increased and included in disease resistance trials in the 1957 season.

Carstens table 1.--Potato variety yields, Mount Vernon, Wash., 1956.

Variety	Average weight per plot <u>1/</u>
	Lb.
Pungo	61.5
Merrimack	58.0
Delus	58.0
Saco	66.5
Katahdin	75.5
X 137-5 (137-5)	70.5
Osage	43.0
Cherokee	66.0
Redkote	54.0
Progress	61.0
Dazoc	56.0

continued

Carstens table 1, continued.

Variety	Average weight per plot 1/
	Lb.
Sheridan	49.0
White Cloud	57.0
ND 457	47.0
Keswick	66.0
Gem	63.0
White Rose	89.0
Menzies Sel.	53.0

1/ Plots, single rows 25 feet long; rows, 3 feet apart; potato seed, 10 inches apart. Fertilizer, 1,000 pounds 6-20-20 per acre. Seed treatment, Agrimycin.

Carstens table 2.--U.S.D.A. selections showing relative yields per plot and percentages of total solids, Mount Vernon, Wash., 1956.

Seedling	Yield per plot 1/	Specific gravity	Total solids
	Lb.		Pct.
B 3262-1	114	1.087	21.5
B 3410-22	209	1.094	23.0
B 2359-84	153	1.100	24.0
B 3446-19	109	1.093	22.8
B 3446-13	206	1.095	23.0
B 3446-12	179	1.090	22.0
B 929-23	225	1.098	24.0
B 3097-82	204	1.090	22.0
B 3526-4	152	1.091	22.0
B 1404-7	110	1.079	19.9
AC 25949	190	1.104	25.0
B 3401-20	149	1.075	18.8
B 3401-25	209	1.084	21.0
B 3446-20	84	(Discard)	
B 3418-10	229	1.090	22.0
B 1268-46	125	1.089	22.0
OB 3031-1	286	1.096	23.0
B 44-14	190	1.087	21.5
B 3410-18	95	1.085	21.0
B 3446-9	103	(Discard)	
B 606-37	308	1.097	23.5
B 3443-6	100	1.100	24.0
B 3508-4	200	1.086	21.0
B 3526-1	130	1.108	25.0
B 3408-20	202	1.096	23.0
B 1268-26	158	1.088	22.0
B 3411-37	263	1.099	24.0
B 3209-35	202	1.090	22.0
AC 25831	249	1.110	26.0
B 2395-14	106	1.090	22.0

continued

Carstens table 2, continued.

Seedling	Yield per plot ^{1/}	Specific gravity	Total solids
	Lb.		Pct.
B 3407-3	204	1.096	23.5
B 2969-15	92	1.089	22.0
Plymouth	240	1.095	23.0
B 3423-5	232	1.090	22.0
B 3520-8	322	1.108	25.0
B 3446-15	76	(Discard)	
B 579-3	177	1.101	24.0
B 926-9	196	1.085	21.0
B 3114-6	159	1.088	21.5
B 962-3	88	1.100	24.0
B 3495-3	194	1.108	25.0
B 3446-5	115	1.100	24.0
B 922-8	109	1.103	24.50
AC 25668	152	1.100	24.0
B 3446-3	45	(Discard)	
B 738-8	138	1.086	21.0
B 3511-21	222	1.100	24.0
B 3424-11	60	1.102	24.0
B 3406-3	173	1.103	25.0
B 3407-26	95	1.108	25.0
B 3407-28	218	1.098	24.0
B 355-24	95	1.095	23.0
ND 457-1	213	1.100	24.0
B 3446-11	180	1.095	23.0
B 3516-15	240	1.087	21.50
B 3406-1	212	1.090	22.0
B 1418-2	209	1.108	25.0
B 2879-4	94	1.094	23.0
B 3407-35	107	(Discard)	
B 3139-24	177	1.099	24.0
B 3423-7	61	(Discard)	
B 3446-17	15	(Discard)	
X 927-3	228	1.105	25.0
B 3516-11	100	1.099	24.0
B 3436-13	227	1.108	25.0
B 3418-15	52	1.095	23.0
B 1268-23	189	1.093	22.0
B 3140-36	85	1.099	24.0
B 3508-11	100	1.101	24.0
X 627-164	15	(Discard)	
B 3446-8	79	(Discard)	
B 2896-10	64	1.102	24.0
B 3405-1	126	1.095	23.0
B 605-10	93	(Discard)	
B 3508-8	160	1.089	22.0
B 2896-10	39	1.095	23.0
ND 457-1-10	171	1.091	22.0

continued

Carstens table 2, continued.

Seedling	Yield per ^{1/} plot	Specific gravity	Total solids
	Lb.		Pct.
ND 2906-1R	91	1.094	23.0
ND 2910-1R	194	1.092	22.50
ND 2774-3R	95	1.091	22.0

^{1/} Plots, 100-foot rows; rows, 3 feet apart; potato seed, 10 inches apart.
Fertilizer, 1,000 pounds 6-20-20 per acre. Seed treatment, Agrimycin.

WASHINGTON
S. B. Locke

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No testing for leaf roll infection was conducted during the 1956 season. However, a certain amount of leaf roll infection occurred in the plantings, and some seedlings were eliminated for this reason.

Of the 513 Aberdeen seedlings grown in single-hill plots during the 1955 season, 419 were grown again at Pullman in 4- and 12-hill plots. Selection for further testing was made at harvesttime on the basis of apparent yield and tuber characteristics. Of these, 76 were saved for further testing.

Out of 237 Beltsville progenies grown in the greenhouse during the winter of 1955-56 and grown again in the field during 1956, 127 were selected at harvesttime for further testing.

In addition to the above, 625 seedlings of 6 progenies, produced from crosses made during the winter of 1954-55 and grown to small tubers during the winter of 1955-56, were grown in single-hill plots in the field at Pullman. At harvesttime 104 were selected for further testing. (Locke table 1.)

Locke table 1.--Seedlings selected at harvest 1956 for further testing.

Progeny number	Parentage	Number selected
A* 316	(Giant-hill Russet Burbank x B 2361-2)	16
A 317	(A 101-17 x B 2361-2)	27
A 322	(B 2361-2 x A 119-15)	5
A 324	(B 2958-2 x ")	2
A 326	(A 119-15 x B 24-58)	4
A 327	(B 2958-2 x A 119-15)	9
A 328	(A 101-17 x B 24-58)	13
B 2032	(Katahdin x X 157-9)	5
B 2193	(Green Mountain x X 157-9)	25
B 2195	(Katahdin x ")	11
B 2196	(Mohawk x ")	28
B 2301	(X1276-185 x ")	58
PX55-1	(Russet Burbank x Redkote)	26
PX55-2	(W. P. 332 x Katahdin)	50
PX55-3	(W. P. 338 x self)	17
PX55-4	(W. P. 332 x ")	4
PX55-5	(Russet Burbank x W. P. 337)	5
PX55-6	(B 2032-32 x self)	2

* A indicates Aberdeen, Idaho, seedlings; B indicates Beltsville, Md., seedlings; W. P. indicates Prosser, Wash., selections; and PX indicates Pullman, Wash., seedlings.

During the winter of 1956-57, seed from 97 crosses was obtained in the greenhouse using an 18-hour photoperiod, and temperatures of 60° to 65° F. Four of the crosses involved Russet Burbank as the seed parent, and the bulk of the others involved seedlings having Russet Burbank parentage.

Potato seed germination tests did not duplicate results obtained last year. The seed lots used were 6 months or more old when germination was attempted, and only part of the seed was dormant in any individual lot. No germination occurred as long as the imbibed seeds were held at 5° C. Exposure to 5° C. for one or more weeks appeared to induce a secondary dormancy in seeds when placed at 20° or 26° C., but this was not evident when they were placed at 10° C. This problem is being pursued further.

WEST VIRGINIA
M. E. Gallegly

Late blight continues to be the most serious disease of potato in West Virginia. This year, following an abnormally wet summer, late blight tuber-rot caused approximately 50 percent yield reductions in the potato growing areas on the western side of the mountains.

Late blight investigations continued to emphasize (1) the development of resistance to the many specialized races and (2) studies on the biology of the fungus.

Resistance to Late Blight

Resistance from Solanum demissum. In previous years, many accessions of Solanum demissum and other Solanum species were screened for resistance to the five most highly specialized races of the late blight fungus. These results indicated that at least one new dominant resistance gene is present in the S. demissum accessions, as well as very high levels of polygenic resistance, commonly referred to as field resistance.

The workers at the Potato Introduction Station, Sturgeon Bay, Wis., were successful in obtaining hybrids from crosses of certain resistant accessions of the hexaploid S. demissum with certain diploid Solanum species. Tests of the interspecific hybrids revealed that the resistance to these same 5 races was carried over from the S. demissum parent.

Certain of these resistant hybrids were selected for crosses with S. tuberosum varieties and selections. These latter crosses were made at Sturgeon Bay, Wis., Beltsville, Md., and Morgantown, W. Va.

The data given in W. Va. table 1 illustrate the type of results obtained when the triple-hybrid families were tested for resistance to the 5 highly specialized races of P. infestans. For example, S. demissum 160221-3 proved to be homozygous for resistance to races 1, 2, 3; 1, 2, 4; 1, 3, 4; 2, 3, 4; and 1, 2, 3, 4. The fact that the accession was resistant to race 1, 2, 3, 4 indicated that it carried a new gene, or genes, for resistance different from the 4 dominant genes now recognized. Furthermore, the F_1 hybrid selection WRF 4.2 was resistant to these races suggesting that the new resistance carried by 160221-3 was dominant.

The triple-hybrid data from family WV 17 (4.2 x B766-55) showed a segregation ratio near 2:1 to race 2, 3, 4 and ratios near 1:1 to the other 4 races. These data indicated that hybrid WRF 4.2 carried a new dominant gene (R_x) and, in addition, the known R_1 gene. The segregation data showed slightly more susceptible segregates than expected. For instance, since R_1 gene gives resistance to race 2, 3, 4, the presence of this gene plus the R_x gene was expected to give a segregation ratio of 3:1; the actual ratio was near 2:1. The segregation ratios of family WV 18, with Katahdin as the S. tuberosum parent, were greatly askew, approaching a ratio of 1:3 in some cases when a 1:1 was expected.

W. Va. table 1.--Reaction of certain S. demissum accessions and interspecific hybrids to 5 highly specialized races of P. infestans.

<u>S. demissum</u> PI No.	Hybrid or family	Parentage	Reaction or Segregation to Race					Geno- type
			1,2,3	1,2,4	1,3,4	2,3,4	1,2,3,4	
160221-3			66:0	61:0	68:0	66:0	94:0	R _x
	WRF 4.2	160221-3 x sou-						
		kupii	R	R	R	R	R	R _x
	WV 17	4.2 x B 766-55	28:24	23:31	23:28	32:18	21:24	
	WV 18	4.2 x Katahdin	27:32	13:47	10:46	53:25	11:35	
	WRF 202.4	1600221-3 x gibber-						
		ulosum	R	R	R	R	R	R _x
	WV 26	202.4 x B 355-35	3:0	2:1	2:1	3:0	2:1	
	WV 27	202.4 x Katahdin	9:2	7:4	10:1	9:2	7:4	
161179-1			19:0	18:0	16:0	16:0	18:0	R _x
	WRF 80.1	161179-1 x sal-						
		tense	R	R	R	R	R	R _x
	WV 19	80.1 x B 355-35	2:1	1:2	1:2	2:1	1:2	
	WV 20	80:1 x Katahdin	8:3	6:5	7:4	9:2	5:6	
161366-5			54:0	41:0	65:0	57:0	41:0	R _x
	WRF 220.4	161366-5 x						
		rybinii	R	R	R	R	R	R _x
	WV 29	220.4 x Katahdin	15:2	12:4	5:11	10:6	8:6	
161732-3			30:6	24:16	29:16	25:4	27:12	
	WRF 125.1	161732-3 x gibber-						
		ulosum	R	R	R	S	S	R ₂ R ₃ R ₄
	WV 21	125.1 x B 355-35	16:5	10:11	11:10	10:11	0:21	
	WV 22	125.1 x Katahdin	19:12	12:19	13:18	0:31	0:31	

Although this data suggests that a new dominant gene is present in S. demissum 160221-3, it is possible that polygenic resistance was high enough to give immunity when present in a large dosage. The segregation ratios obtained might be explained on this basis.

The results from S. demissum accession 161732-3 were slightly different from that obtained with 160221-3. The data showed that the S. demissum parent was segregating for resistance to all 5 races. The F₁ selection, WRF 125.1, proved to be a R₂R₃R₄ genotype. As expected, near 1:1 segregation ratios were obtained with all races except races 2,3,4, and 1,2,3,4. However, when the R₁ gene was supplied by the S. tuberosum parent, B 355-35, the expected ratio of 1:1 was obtained with race 2,3,4. Thus, at present no new genes have been obtained from 161732-3.

In further tests of the resistance carried by these triple-hybrids, 34 clonal selections were sent to J. S. Niederhauser, The Rockefeller Foundation, Mexico, to determine their field resistance in the Toluca Valley. Even though all selections were susceptible in this area (W. Va. table 2), a few showed a high degree of field resistance. Within the group carrying the R_x resistance there was a scattering of individuals from class 1 (highly resistant) to class 5 (dead) with the majority of individuals in class 5. This type of segregation

suggests that a polygenic system is in operation with the degree of field resistance expressed by a selection determined by the number of polygenes present.

W. Va. table 2.--Resistance of triple-hybrid clonal selections to late blight in the Toluca Valley, Mexico.

Family	Genotype of selections	Number of selections in disease index classes*					
		0	1	2	3	4	5
WV 17,18,20,26,27,29	R_x	-	1	1	3	9	8
WV 21	$R_1R_2R_3R_4$	-	-	-	-	-	1
WV 22, 24	$R_2R_3R_4$	-	-	1	2	1	1
WV 22	R_2R_4	-	-	-	-	-	1
WV 20	R_1	-	-	-	-	-	1
WV 18, 29	Recessive	-	-	-	1	-	3
Total		-	1	2	6	10	15

* This disease index used by Dr. Niederhauser represents total blight: 0, no blight; 5, plants dead.

From these preliminary data it appears that resistance obtained from S. demissum is controlled by two genetic systems, dominant-gene and poly-gene systems. By using race 1,2,3,4 of the late blight pathogen, plants believed to have a new dominant gene were selected. However, when grown in the field in Mexico, where all known races occur in nature, plants with this gene became infected and polygenic resistance was expressed.

The fact that plants with this new dominant gene were susceptible in Mexico leads to the belief that there are many new races of the pathogen present in this area. The races cannot be identified by the present International System of Nomenclature until new dominant genes are made available in single-gene differential hosts.

Resistance from Solanum tuberosum. Although there is considerable interest in S. demissum as a source of new and different resistance genes, the possibilities are very promising that clones highly resistant to the many races of the late blight fungus may be developed within S. tuberosum. The immediate goal of breeding work within S. tuberosum is to combine the 4 recognized dominant genes with a high level of polygenic resistance in a commercially desirable clone. In the future, as the new genes from S. demissum become available in desirable clones, they will be combined with resistance now available in S. tuberosum.

Some progress has been made toward the immediate goal. Clonal selections from crosses involving the 4 resistance genes (R_1, R_2, R_3 , and R_4) have been tested with the 5 races of the pathogen described above to determine their dominant genotypes. Since all these selections were susceptible to race 1,2,3,4, their degree of susceptibility was rated in greenhouse tests in hopes of obtaining a measure of polygenic resistance.

To determine if there was a correlation between the greenhouse ratings and actual performance in the field, a number of selections were sent to Dr. Niederhauser in Mexico and planted in the Toluca Valley where race 1,2,3,4 is known to be prevalent in nature.

The parentage, dominant genotypes, greenhouse ratings for polygenic resistance, and the Mexico field ratings for polygenic resistance of some of these selections are presented in W. Va. table 3. The data show no correlation between the greenhouse ratings for polygenic resistance and actual performance in the field in Mexico. It is clear however, that a considerable degree of polygenic resistance, as measured by performance in Mexico, is present in the S. tuberosum selections. It is interesting to note that the most resistant selection, WV 14-17, was derived from parents both of which were killed by blight in Mexico.

W. Va. table 3.--The parentage, dominant genotypes, greenhouse ratings for polygenic resistance and Mexico field ratings of polygenic resistance of certain West Virginia blight-resistant selections.

Family	Parentage	Dominant genotype	Polygenic resistance*	
			Greenhouse	Mexico
WV 11-32	B 922-6 x 1682c (1)	R ₁	2	5
11-47	" x "	R ₁	2	5
WV 12-1	3VW-9 x 1682c (1)	r	2	4+
12-2	" x "	R ₁	4	4+
12-7	" x "	R ₁ R ₃	3	4+
12-8	" x "	R ₁ R ₂ R ₃	3	5
12-9	" x "	r ₁ R ₂ R ₃	3	5
12-10	" x "	R ₁	3	4+
WV 13-1	3WM-19 x Ac.25953	R ₁ R ₃ R ₄	3	5
13-3	" x "	R ₃	3	3+
13-5	" x "	R ₁ R ₃	4	5
13-10	" x "	R ₁ R ₃ R ₄	-	3
WV 14-8	3WM-19 x 1682c (1)	R ₁ R ₂	4	5
14-14	" x "	-	2	5
14-15	" x "	R ₁	4	5
14-17	" x "	R ₁ R ₂ R ₃ R ₄	4	3-
WV 16-1	3XX-1 x 1682c (1)	R ₁	3	5
16-2	" x "	R ₁ R ₂ R ₃	5	4+
16-10	" x "	R ₁ R ₂ R ₃	3	5

* Six disease index classes were used in these ratings: 0, no infection; 1, very few lesions; 2, lesions more numerous; 3, lesions numerous, up to 50% of foliage affected; 4, lesions very numerous with approximately 75% foliage affected; 5, plants dead or dying.

It remains to be seen if a selection showing a high degree of polygenic resistance in Mexico will also show the same high degree when grown in different areas in the United States. It is known that certain environmental conditions alter the degree of polygenic resistance to certain diseases of other crops. Thus, it is possible that a potato variety or selection expressing polygenic resistance in one country may be very susceptible in another.

The sexual stage of *P. infestans* in relation to breeding for resistance.

The recent discoveries of Gough and Smoot of West Virginia University and Fort Detrick, that sexuality or compatibility groups exist in the late blight fungus, is a factor to be considered in breeding for resistance. It has been pointed out that at present, only one of the sexual groups has been found in this country, whereas in Mexico, both groups were found in a ratio of 1:1. This fact, if race origin is attributed to genetic recombinations, helps explain why all known races, and races still unidentified, are present in Mexico. It also helps explain why certain new races have been slower to appear in the United States where the fungus has to depend upon the slower process of mutation. Studies on the sexual stage of the late blight fungus are being continued at this station.

WEST VIRGINIA
Committee Report 1956

M. E. Gallegly, Chairman, R. V. Akeley, Reiner Bonde, C. J. Eide,
J. L. Howatt, J. S. Niederhauser, L. C. Peterson, and W. R. Mills

LATE BLIGHT INVESTIGATIONS

The Late Blight Investigations Committee of the Potato Association of America has limited its thoughts and activities to the problem of breeding for resistance to late blight and to physiologic specialization by the pathogen. Although the committee as a whole has not been active during the last year, the various members have exchanged information and ideas through personal conversations and correspondence.

In the past, the committee helped clarify the complicated interrelationship of physiologic races and genes for resistance to these races and assisted in the adoption of an international nomenclature of these races and genes. Consideration was given to the establishment of a uniform set of differential hosts and the maintenance of pure cultures of the various races. In addition, discussions were carried on with Plant Quarantine officials concerning the importation of selected races to use as tools in a program of breeding for resistance.

The International Nomenclature System has been helpful and useful. The committee recognizes that future work may show the need for a revision or an entirely different system. Pure cultures of physiologic races have been maintained by individuals at different institutions. The maintenance of a uniform set of differential hosts has been more difficult. Clones tend to become contaminated with virus diseases and some produce low yields in certain areas. The Potato Introduction Station has assisted in maintaining clean hosts. The committee has been advocating the development of true-breeding lines of *S. demissum* as differential hosts so that true seed might be used to produce plants for race identification. Plant Quarantine officials have hesitated to allow new races to be imported. Their stand is justifiable when one considers the possible damage that might occur if certain of these races were allowed to escape.

As for the future in breeding for resistance, workers are turning more toward the polygenic type of resistance. The obvious reason for this trend is the occurrence of physiologic races capable of infecting and destroying varieties with all of the known dominant genes. In the past, as the four dominant genes were discovered and introduced into commercial potato seedlings, new races were found in a short time. At present, workers have found other new dominant genes and indications are that seedlings with these new genes eventually will go out with new races. In fact, workers in Mexico reported that seedlings with at least one of these new dominant genes blighted there the first time they were grown in the field.

In contrast, the polygenic or so-called field resistance appears to give resistance to all of the recognized physiologic races. Plants with this type of resistance are not immune and under severe blight conditions usually have lesions. Some workers have established clones with varying levels of the polygenic type of resistance. Whereas most selections have moderate to low levels of this resistance, some appear to have a very high degree of resistance. In fact, the level of polygenic resistance in some clones approaches

the degree of resistance given by dominant genes to race 0. The workers in Mexico, where all known races occur in nature, indicate that this type of resistance is the only type giving effective control there.

The dominant type of resistance has been derived from Solanum demissum, whereas the polygenic type is found scattered among various seedlings of S. tuberosum. One cannot be sure of the original sources of this latter type, even though it is known that certain S. demissum accessions carry both types. Many different terms, such as field resistance, minor-gene resistance, multiple-gene resistance and multi-genic resistance, have been used to denote the type of resistance referred to as polygenic resistance in this report. The Late Blight Investigations Committee has not made a decision as to which term would be most appropriate. Multiple-gene, or multi-genic, and polygenic resistance are considered synonymous by some breeders, whereas others consider that these terms have slightly different meanings.

In addition to resistance work with S. demissum and derivatives, attention is being turned toward the resistance carried by other species such as S. bulbocastanum, S. stoloniferum, S. pinnatisectum, etc. Difficulty has been encountered in obtaining successful crosses with some of them, but with special techniques, there is indication that this barrier may be broken. The Potato Introduction Station, at Sturgeon Bay, Wis., has been supplying many of these species, and workers there have made some of the initial crosses. It is possible that other types of resistance may be carried by these species. As stated by committee member J. L. Howatt, "there are millions of questions which are begging answers in regard to the development of blight resistance through the utilization of wild species."

A great deal of work with physiologic specialization by the fungus is being done by various committee members and others. This has followed along the lines of race surveys in a given area and studies on the nature of race development. These race surveys have shown that most all of the races of the International series, including race 1, 2, 3, 4, have been found in Canada, Mexico, and the United States. In addition, isolates which are more highly specialized than race 1, 2, 3, 4 (i.e. 1, 2, 3, 4, 5) have been found in Canada and Mexico.

Studies on the nature of race development indicated that that the fungus is unstable, particularly for the race 4 character, and that new races arise by mutation. Detailed studies at West Virginia have shown that race 4 will appear in almost any culture. For instance, in a culture of race 0, race 4 may be found; in a culture of race 1, race 1, 4 may be found; in a culture of race 1, 2, race 1, 2, 4 may be found, etc. Thus, the committee would like to point out that the R_4 gene is useless in a practical program of breeding for resistance. Race surveys in Canada, Europe, the United States and other areas have shown a predominance of isolates with the race 4 character. Although at present, the polygenic resistance appears to be effective against all races, it must be considered as a possibility that new races also may arise capable of destroying varieties with high levels of this type of resistance.

The recent discovery that sexual or compatibility mating groups exist in P. infestans in Mexico raises the question of the possible origin of new races through genetic recombinations. The possibility of the sexual or oospore stage as means of survival also must be considered. At present, only one of the mating groups has been found in isolates from the United States and Canada, whereas both groups have been found in Mexican isolates. Further work is necessary to determine if the sexual stage is a factor in race development and survival in Mexico. Also, with the knowledge that mating groups exist, a further search must be made in the United States and Canada to determine definitely whether both groups occur in any area in these countries.

Even though potato breeders recognize the complicating factors discussed above, they are going ahead with programs of breeding for resistance to late blight with some success. The goal of some is to develop a commercial variety having all the known dominant genes plus a high level of polygenic or field resistance. Large seedling populations are being screened each year with selected physiologic races to sort out the dominant genes. A good greenhouse technique of selecting for polygenic resistance has not been developed, although attempts are being made to work out such a method. In the past few years, with cooperation from committee member J. S. Niederhauser, of The Rockefeller Foundation in Mexico, many potato breeders have submitted selections for field tests in Mexico. At present, this approach appears to be the most successful one for determining the degree of polygenic resistance in a selection. The committee wishes to express appreciation to The Rockefeller Foundation for their cooperation and recommends that testing of breeding material in Mexico be continued.

WISCONSIN

D. C. Cooper, R. W. Hougas, G. H. Rieman, K. I. Beamish
M. L. Magoon, J. Lee, M. S. Cipar and R. H. Whalen

Studies of interspecific crossability and cytogenetic investigation of the tuber-bearing *Solanum* species, outlined in last year's report, were considerably expanded in 1956. F₁ seed was obtained from 131 diploid-diploid, 59 tetraploid-diploid, and numerous tetraploid-tetraploid interspecific matings. F₂ and BC₁ populations of 17 diploid combinations were grown for genetic study.

The F₁ of 18 colchicine-induced tetraploid-*S. tuberosum* matings were grown in the field. Most of the hybrids were quite vigorous and some, particularly those derived from selections of cultivated South American diploid species, produced very good tubers. Selected F₁ individuals were selfed and were backcrossed to *S. tuberosum*. Cytological studies are being conducted with this material. Some phases of the study were completed and are now in press.

The Mexican diploid species *S. pinnatisectum* possesses high resistance to both late blight and southern bacterial wilt. Attempts to hybridize this species (colchicine-induced tetraploid selections) directly with *S. tuberosum* have been unsuccessful. Crosses were initiated between *S. pinnatisectum* and five South American diploid species, all known to hybridize with *S. tuberosum*, in hopes of obtaining interspecific hybrids that could be hybridized with *S. tuberosum*. Seedballs were produced following every cross. Most of the seed, however, appeared to be in various stages of abortion. Material has been collected to study seed development and to determine the nature of seed failure.

Reciprocal matings were made between 4 Mexican tetraploid species (*S. fendleri*, *S. papita*, *S. stoloniferum*, *S. polytrichon*). Seed was set from each mating. The F₁ families were grown and backcrosses were made. Meiotic studies are underway with this material.

Preliminary results of interspecific matings of the Mexican hexaploid species *S. demissum* with 18 diploid species, as well as crosses of the resulting hybrids to *S. tuberosum* and the Mexican tetraploid *S. stoloniferum*, were reported last year. Studies of seed development and seed failure in some of these matings were published (*Amer. Jour. Bot.* 42:297-304). Detailed analysis of meiosis in certain of this material now has been made and is being prepared for publication.

WISCONSIN
R. H. Larson and R. V. Akeley

Physiological Internal Tuber Necrosis

Six potato varieties listed in Larson table 1 were field tested for resistance to non-parasitic internal tuber necrosis at Hancock, Wis., in 1956.

Larson table 1.--Incidence of internal tuber necrosis

Variety	Necrotic Index ^{1/}
Boone	0
Saco	8
Merrimack	11
Plymouth	11
Delus	13
Ontario	68

^{1/} 0 - all tubers free of internal necrosis

-100 - all tubers with severe internal necrosis

WISCONSIN

G. H. Rieman and Donald A. Young

Breeding Problems Associated With Resistance To Scab

Progeny tests made on scab-resistant selections derived from Jubel and Hindenburg demonstrated two important relationships. In the breeding program in Wisconsin, high resistance to scab (T-1 to 2-2 classes) continues to show association with a light-brown, flaked-type russet skin and non-parasitic internal tuber necrosis.

The light-brown flaked-type russet skin character varies considerably under environmental influences. The character tends to be suppressed in immature tubers. Tubers may show a smooth white skin on the apical end and a russet light-brown skin on the older portions. A netted type of skin cracking is frequently associated with this character and at times cankerous lesions occur which may or may not be associated with the scab pathogen. The inheritance pattern for this kind of russet is complex as indicated by a continuous range of expression from heavy russet which is rough to the touch to smooth in segregating families. The flaked russet character in its extreme forms is considered undesirable since soil tends to adhere to the rough tuber surface. Individuals with heavily flaked russet tubers were again found to be more resistant to scab than the individuals with smooth tubers in families segregating for these two characters, as has been reported previously.

A form of non-parasitic internal tuber necrosis develops readily in susceptible potato crops in the light sandy soils on the University of Wisconsin Potato Research Farm near Rhineland, Wis. The scab-resistant variety Ontario shows this defect in varying degrees each year and it is severe in the Hindenburg variety every year. The expression and the amount of necrosis occurring in these two susceptible check varieties and in scab-resistant breeding stocks are dependent upon seasonal growing conditions. In general, dry hot seasons favor the development of non-parasitic internal tuber necrosis, but it is also present in lesser-amounts during cool wet seasons, such as occurred in 1956. Similar relationships have been described by R. H. Larson. It now appears that scab-resistant selections derived from Hindenburg and Jubel tend to be susceptible to non-parasitic internal tuber necrosis. More promising scab-resistant selections have been discarded in the Wisconsin breeding program because of this defect than for any other undesirable character. It has been found that selections showing definite internal necrosis tend to produce progenies with exceptionally high percentages of this defect.

Most of the highly scab-resistant varieties (2-2 class, or better) recently released with Jubel or Hindenburg parentage tend to be susceptible to internal necrosis. In this regard the highly scab-resistant Early Gem variety (B 515-2) is most interesting since it appears to be resistant to internal necrosis and it does not have the scab-resistant German varieties in its pedigree. There is some evidence that the genes for resistance to scab and susceptibility to non-parasitic internal tuber necrosis are linked in the varieties Jubel and Hindenburg. The self, sib, and top-cross progenies listed in Wisconsin table 1 have both of these scab-resistant German varieties in their parentage. The two parent clones X137.52 and X143.52 have been tested for resistance to scab and resistance to internal necrosis for 5 seasons.

Their scab resistance ratings range from 1-1 to 2-2. Occasional trace amounts of internal necrosis have been observed. Both parents produce tubers with a mild form of flaked russeting and no skin cracking. The selections reported in Wisconsin table 1 will be studied in an attempt to find combinations showing high resistance to scab, resistance to non-parasitic internal tuber necrosis, and smooth tuber skin.

Wisconsin table 1.--Combining ability studies in parental lines, 1956. Progeny tests for two promising parents, Wisconsin X137.52 and Wisconsin X143.52 resulting from self, sib and top-cross matings. Selections made for horticultural tuber type and resistance to scab in virus-X-immune populations.

1956 cross number	Parentage	Sel. based on tuber type			Sel. based on tuber type and resistance to scab			Total Selection Ratio
		Pop. ^{1/}	Sel.	Sel. Ratio	Pop. ^{2/}	Sel.	Sel. Ratio	
Selfs								
X13.56	X137.52 (X)	173	33	1:5	93	12	1:8	1:6
X22.56	X143.52 (X)	195	29	1:7	122	20	1:6	1:6
Sibs								
X15.56	X143.52 x X137.52	119	36	1:3	48	6	1:8	1:4
X3.56	X124.52 x X137.52	117	24	1:5	84	24	1:3	1:4
X4.56	X124.52 x X143.52	63	15	1:4	30	9	1:3	1:4
X6.56	X125.52 x X137.52	183	30	1:6	112	41	1:3	1:4
X7.56	X125.52 x X143.52	196	37	1:5	124	26	1:5	1:5
X8.56	X131.52 x X137.52	239	39	1:7	168	48	1:3	1:5
X9.56	X131.52 x X143.52	119	23	1:5	92	38	1:2	1:3
X14.56	X141.52 x X137.52	232	51	1:5	161	27	1:6	1:5
X18.56	X141.52 x X143.52	166	30	1:6	118	27	1:4	1:5
X17.56	X188.52 x X137.52	96	22	1:4	55	6	1:9	1:5
X23.56	X188.52 x X143.52	122	23	1:5	86	4	1:4	1:4
Top-crosses								
X10.56	B515-2 x X137.52	671	66	1:10	432	40	1:11	1:10
X19.56	B515-2 x X143.52	776	62	1:13	363	48	1:7	1:10
X11.56	B606-67 x X137.52	73	12	1:6	49	2	1:24	1:9
X20.56	B606-67 x X143.52	396	48	1:8	278	33	1:8	1:8
X12.56	X137.52 x 1301-1	87	8	1:11	68	5	1:14	1:12
X24.56	1301-1 x X143.52	159	22	1:7	399	24	1:17	1:12

1/ Total population used to study combining ability for horticultural tuber type - 4182 individuals.

2/ Total population used to study combining ability for horticultural tuber type and resistance to scab - 2,882 individuals.

WISCONSIN

F. J. Stevenson and E. D. Jones
RED DOT FOODS, Inc.

Red Dot Foods, Inc. has organized a potato-breeding program with the prime objective of producing new varieties of potato with higher chip quality than any that are now being used. Other characteristics, such as yield, specific gravity, tuber shape, keeping quality, season of maturity and resistance to the most troublesome diseases, will also be given consideration.

The company owns several thousand acres of land in the vicinity of Rhineland, Wis., and has designated one of its farms as the Red Dot Research Farm where the field work is done. In addition, it has built an excellent greenhouse on its Fair Oaks property at Madison where the seedlings are grown and the crosses will be made.

FIRST-YEAR SEEDLINGS

In 1956 approximately 7,000 seedlings, representing 47 family lines, obtained from the Plant Industry Station, Beltsville, Md., were planted on the Red Dot Research Farm. Ninety-seven percent of the tubers germinated. Weather conditions were favorable, and an excellent crop was produced. 488 selections were made on the basis of tuber shape and apparent yielding ability. Samples of each of these are now in cold storage (38° F.) at the E. Washington Ave. plant., where, after about 4 months, they will be tested as to their reconditioning behavior and chip quality. A total of 814 selections from 9 progenies will be tested in a similar manner to determine the crosses that produce the highest percentage of seedlings with satisfactory reconditioning and chipping qualities.

In 1957 all selections will be grown in larger plots on the Red Dot Research Farm and tested again for their reactions to storage conditions and chipping quality. A study will be made of the correlation between the results obtained from first-year seedlings grown in single hills, and the results from the same seedlings grown the second year, in larger plots.

TEN HILL ROWS

In the fall of 1955 E. D. Jones visited Presque Isle, Maine, at harvest-time and brought back to Wisconsin 236 selections produced under the National Potato-Breeding Program. These had been selected for tuber shape and apparent yielding ability, and tested over various periods of years for maturity, fertility, and reactions to a number of diseases.

In 1956 the 236 selections were grown in 10-hill rows on the Red Dot Research Farm. Many of these selections were early maturing, and about 50% of them produced relatively high yields of excellent-shaped tubers, and were saved for the 1957 tests.

A number of these showed satisfactory specific gravity and excellent chip quality when cooked before being placed in cold storage; other samples of the same seedlings are now in cold storage where they will remain for several months, after which they will be reconditioned and tested again for chip quality.

GREENHOUSE SEEDLINGS

About 16,000 seedlings representing 59 family lines were potted in the greenhouse from September 21 to September 28. These will be harvested the second week in January. Some family lines will be tested for chip quality directly from the greenhouse, and the same seedlings will be planted in Rhinelander and tested again for chip quality, in an attempt to ascertain whether or not results obtained from greenhouse material gives a reliable index of results to expect from field-grown stock.

DATE OF SEED CUTTING

Two dates of seed cutting tests, one using 4 early varieties of potato and one with 4 late varieties, were grown on the Red Dot Research Farm. Similar tests were run at several other stations under the direction of Robert V. Akeley, leader of the National Potato-Breeding Program. The early varieties included Cobbler, Cherokee, Chippewa and Pungo; the late varieties Kennebec, Katahdin, Green Mountain and Sebago. At Presque Isle, Me., seed of each of these varieties was cut each month from September, 1955 to April, 1956, inclusive, suberized, and shipped to Wisconsin. One lot of seed tubers of each was shipped whole and cut fresh at planting time in May. The data for these two tests are given in Tables 1 and 2.

In both tests, date of seed cutting had seemingly no effect on stand since almost perfect stands were obtained on all plots. The analysis of variance for the early varieties indicated that there were no significant differences in yield or percentage total solids. In the test of the late varieties, the effect of date of seed cutting on yield was not significant, but the effect on percentage of total solids was highly significant. This phenomenon was not the result of earliness of seed cutting, since the seed cut in October produced the highest percentage total solids; to be followed in order by the seed cut in January, April, March, September, November, May, February and December. Statistically, the differences were significant, but they were so small that no practical value could be attached to them.

Table 1. Effect of Seed Cutting Dates on Stand, Yield, and Percentage of Total Solids of 4 Early Maturing Varieties of Potato.

Red Dot Research Farm, Rhinelander, Wisconsin, 1956

Variety	Month seed cut	Stand count Total of 4 replications	Yield over 2" Per Acre	Total solids Mean of 4 replications
			Bu.	Pct.
Cobbler	Sept.	97	329	19.9
	Oct.	97	404	20.0
	Nov.	100	319	19.6
	Dec.	99	351	19.9
	Jan.	98	404	20.3
	Feb.	99	407	19.9
	Mar.	98	356	19.6
	Apr.	100	344	19.9
	May	100	336	20.3
Cherokee	Sept.	100	421	20.6
	Oct	100	378	20.5
	Nov.	100	426	20.8
	Dec.	100	339	19.9
	Jan.	100	411	20.8
	Feb.	100	399	20.0
	Mar.	100	445	20.3
	Apr.	100	387	20.1
	May	100	348	20.0
Chippewa	Sept.	97	462	18.7
	Oct.	99	399	18.8
	Nov.	100	414	18.7
	Dec.	98	438	18.5
	Jan.	98	404	18.3
	Feb.	97	421	18.7
	Mar.	100	450	19.1
	Apr.	100	399	18.6
	May	100	450	18.7
Pungo	Sept	99	414	19.9
	Oct.	99	438	20.3
	Nov.	100	457	19.7
	Dec.	100	428	19.7
	Jan.	99	455	20.0
	Feb.	99	378	20.0
	Mar.	100	407	19.7
	Apr.	99	365	19.7
	May	100	433	20.0

Av. 423

Av. 418

Table 2. Effect of Seed Cutting Dates on Stand Yield and Percentage of Total Solids of 4 Late Maturing Varieties of Potato.

Red Dot Research Farm, Rhinelander, Wisconsin, 1956

Variety	Month seed cut	Stand count Total of 4 replications	Yield over 2 nd	Total solids
			per acre	Mean of 4 replications
			Bu.	Pct.
Kennebec	Sept.	98	590	19.9
	Oct.	98	564	20.0
	Nov.	99	588	19.7
	Dec.	99	603	19.4
	Jan.	100	607	20.0
	Feb.	100	588	19.3
	Mar.	99	627	19.4
	Apr.	100	545	20.0
	May	100	578	19.9
Katahdin	Sept.	97	474	19.3
	Oct.	98	484	19.3
	Nov.	96	474	19.2
	Dec.	98	457	19.6
	Jan.	97	460	19.6
	Feb.	96	472	19.2
	Mar.	100	486	19.5
	Apr.	99	489	19.6
	May	99	489	19.2
Green Mountain	Sept.	100	588	20.3
	Oct.	100	610	21.0
	Nov.	99	615	20.4
	Dec.	100	607	19.9
	Jan.	98	617	20.4
	Feb.	100	612	20.1
	Mar.	100	617	20.3
	Apr.	99	559	20.4
	May	100	598	20.0
Sebago	Sept.	98	453	18.8
	Oct.	100	455	19.8
	Nov.	98	511	19.1
	Dec.	99	491	18.8
	Jan.	100	537	19.5
	Feb.	100	532	19.0
	Mar.	100	491	19.5
	Apr.	100	518	19.3
	May	100	450	19.1

WYOMING

W. A. Riedl and J. R. Vaughn

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The potato-breeding work in Wyoming in 1956 consisted primarily of crossing high-yielding, red-skinned seedlings and varieties with scab-and ring-rot-resistant seedlings, as well as with seedlings having high specific gravity. Variety and seedling yield trials were again conducted at Laramie, Torrington, and Powell.

Variety Yield Trials

Two yield trials, each consisting of 18 varieties and seedlings, were conducted at Laramie. These were planted on May 31 in rows 40 feet long and replicated 4 times. The plots were harvested on September 27. The tubers were graded over a 2-inch screen to obtain the yield of U. S. No. 1 potatoes. Specific gravity tests were made on samples of each variety to obtain the dry-matter content.

Nine varieties and 13 promising seedlings were grown in a yield trial at the Torrington Substation in plots 35 feet long and replicated 4 times. These were planted June 6 and harvested October 8. The tubers were graded over a 1 7/8-inch screen on November 27.

Seven varieties and 11 promising seedlings were planted in a yield trial at the Powell Substation in plots 30 feet long and replicated 4 times. This trial was planted May 28 and harvested September 28. Wyoming tables 1 and 2 show the results of these trials.

Seedling Families and Seedling Increase

Approximately 50 seedling families were grown at Laramie. A number of promising selections were made from families having Red McClure as a female parent. Twenty-one seedlings were increased at Laramie and five seedlings were increased at Torrington.

Wyo. table 1.--Potato variety and seedling trial, Laramie, Wyo., 1956.^{1/}

Variety or seedling	Yield per acre		Rank		Rank %		Dry matter	Stand
	Total	U.S. No.1	U.S. No.1	U.S. No.1	U.S. No.1	U.S. No.1		
	Bu.	Bu.		Pct.			Pct.	Pct.
LaSoda	450	394	1	88	1		20.5	92
Red Pontiac	444*	362*	2	82	5		20.1	91
Sheridan	426*	328	4	77	11		21.0	92
Satapa	384	282	9	74	15		19.0	92
Redbake	382	332	3	87	2		20.5	90
Redglo	374	294	7	79	10		22.3	92
Kennebec	370	300	5	81	7		23.3	93
Yampa	359	299	6	83	3		22.0	93
Teton	346	287	8	83	3		19.9	92
Progress	344	255	14	74	15		19.7	92
Bliss Triumph	343	258	13	75	14		18.4	93
Irish Cobbler	341	263	12	77	11		- **	92
Desota	337	273	10	81	7		20.1	93
White Rose	329	230	16	70	18		- **	92
Dazoc	328	270	11	82	5		20.5	92
Red McClure	313	249	15	80	9		19.7	92
Early Gem	291	216	17	74	15		18.4	92
Russet Burbank	261	198	18	76	13		- **	93
Gen. Mean	357	283		79			20.4	92
LSD 5% level	65	57						
W.2650	427	385	1	90	1		18.8	92
W.2688	403*	350*	2	87	2		18.8	92
W.2578	399*	328*	3	82	10		18.8	92
W.2565	391	320	6	82	10		20.1	91
W.2598	385*	326*	4	85	5		18.7	92
W.2662	385*	317	7	82	10		22.5	92
W.2541	373*	325	5	87	2		19.5	92
W.2550	373*	316	8	85	5		21.4	93
Bliss Triumph	367*	300	9	82	10		18.4	93
W.2646	362	270	11	75	18		- **	92
W.2556	349	285	10	82	10		19.0	93
W.2687	319	267	12	84	9		19.9	92
W.2722	308	246	13	80	16		22.5	92
W.2542	287	245	14	85	5		19.5	93
W.2549	285	216	17	76	17		- **	92
W.2674	275	233	15	85	5		17.5	93
W.2548	266	230	16	86	4		18.7	93
W.2558	249	202	18	81	15		20.1	94
Gen. Mean	345	287		83			19.6	92
LSD 5% level	61	59						

* Statistically equal to highest yield at the 5% level of significance.

** Discarded before specific gravity tests were made.

^{1/} Previous crop, barley. Planted, May 31. Harvested, September 27. One-row plots, 40 feet long, replicated 4 times. Dusted with sulphur and 5% DDT, July 10 and 23, and August 8. Irrigated, July 11, 24, August 9, and September 6.

Wyo. table 2.--Potato variety and seedling trial, at Torrington and Powell Substations, 1956.

Variety	Yield per acre ^{1/}		Rank		Rank %		Dry matter
	Total	U.S. No.1	U.S. No.1	U.S. No.1	U.S. No. 1		
	Bu.	Bu.		Pct.			Pct.
Torrington:							
LaSoda	710	644	1	91	1		18.6
W.2541	619*	538*	2	87	2		18.7
W.2578	593*	517*	3	87	2		18.4
Sheridan	581*	483*	4	83	12		19.7
W.2688	539	462*	5	86	4		19.3
W.2646	482	380	8	79	16		15.8
W.2483	482	407*	6	84	8		18.7
W.2550	481	396	7	82	13		20.3
Progress	479	370	10	77	18		19.7
Redglo	462	351	13	76	19		18.4
Red Pontiac	454	356	11	78	17		18.2
W.2549	446	373	9	84	8		19.3
Bliss Triumph	436	321	16	74	21		18.0
W.2565	428	348	14	81	15		19.7
Redbake	420	352	12	84	8		21.6
Early Gem	419	320	17	76	19		18.7
W.2598	390	334	15	86	4		17.3
W.2548	362	309	18	85	6		18.4
Dazoc	361	307	19	85	6		18.8
W.2557	332	273	21	82	13		18.0
W.2556	327	276	20	84	8		19.9
W.2687	143	88	22	61	22		20.5
Gen. Mean	452	373		81			18.9
LSD 5% level	155	242					
Powell:							
LaSoda	355	264*	4	74	10		-
W.2662	347*	290	1	84	1		-
Bliss Triumph	343*	218	11	64	16		-
W.2550	341*	273*	2	80	4		-
Sheridan	339*	270*	3	80	4		-
Red Pontiac	333*	227*	10	68	13		-
W.2598	330*	240*	9	73	12		-
W.2549	324*	259*	5	80	4		-
Early Gem	321*	246*	7	77	8		-
Progress	318*	196	13	62	18		-
W.2565	313*	244*	8	78	7		-
W.2578	309*	251*	6	81	2		-
W.2556	305*	200	12	65	15		-
W.2688	284	188	15	66	14		-
W.2541	275	176	18	64	16		-

continued

Wyo. table 2, continued.

Variety	Yield per acre ^{1/}		Rank	U.S. No.1	Rank %	Dry matter
	Total	U.S. No.1	U.S. No.1		U. S. No. 1	
	Bu.	Bu.		Pct.		Pct.
Russet Burbank	259	195	14	75	9	=
W.2548	252	187	16	74	10	=
W.2722	227	184	17	81	2	=
Gen. Mean	310	228		74		
LSD 5% level	65	63				

^{1/} Yields corrected for stand.

* Statistically equal to highest yield at the 5% level of significance.

Torrington:

Previous crop, alfalfa. Planted, June 6. Harvested, October 8. One-row plots, 35 feet long, replicated 4 times.

Powell:

Previous crop, beans. Planted, May 28. Harvested, September 28. One-row plots, 30 feet long, replicated 4 times.



